

PATENT ABSTRACTS OF JAPAN

(11)Publication number : **09-183856**
 (43)Date of publication of application : **15.07.1997**

(51)Int.Cl.

C08J 3/24
B01J 20/26
C08J 3/12
C08J 5/18
 // **C08F 20/06**
C08K 5/053
C08L 33/02

(21)Application number : **08-287124**

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(22)Date of filing : **29.10.1996**

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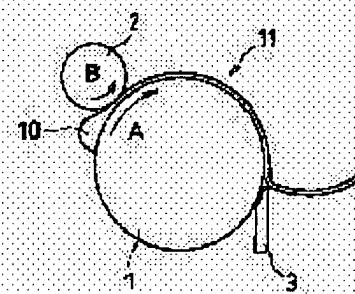
Priority number : **07286266** Priority date : **02.11.1995** Priority country : **JP**

(54) WATER-ABSORBING RESIN AND ABSORBING MATERIAL AND ITS PRODUCTION

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain an absorbing material excellent in various kinds of absorbing characteristics such as absorbing rate or absorbing magnification under pressure and shape-retaining property and provide a method for inexpensively producing the absorbing material by simplifying a production process to improve productivity.

SOLUTION: Water content of a water-containing gel of a hydrophilic crosslinking polymer is reduced while pressurizing (rolling). A water-containing gel composition 10 comprising, e.g. a water-containing gel containing a crosslinked poly(meth)acrylic acid (salt), a glycerol (e.g. a polyhydric alcohol), a polyester fiber (e.g. a forming auxiliary material), etc., is fed onto the upstream side of a pressure roller 2 in a drier drum 1. The water-containing gel composition 10 is pressurized (rolled) and heated by a pressure roller 2 to form a sheet 11. Thereby, the objective sheet-like absorbing material whose at least one side is smooth is obtained.



LEGAL STATUS

[Date of request for examination] 18.07.2003
[Date of sending the examiner's decision of rejection]
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]
[Date of final disposal for application]
[Patent number]
[Date of registration]
[Number of appeal against examiner's decision of rejection]
[Date of requesting appeal against examiner's decision of rejection]
[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] Absorptivity resin characterized by swelling so that it may have an anisotropy by water absorption.

[Claim 2] A compression ratio is 2-1,000. Absorptivity resin according to claim 1 characterized by being compressed to become within the limits.

[Claim 3] The absorptivity ingredient characterized by being fabricated in the shape of [of 1,000 or less mgf] a sheet whenever flexible including absorptivity resin according to claim 1 or 2.

[Claim 4] The absorptivity ingredient according to claim 3 characterized by swelling so that it may have curvature by water absorption.

[Claim 5] The manufacture approach of the absorptivity ingredient characterized by decreasing moisture, pressurizing the water gel of the hydrophilic cross linked polymer.

[Claim 6] The manufacture approach of the absorptivity ingredient according to claim 5 characterized by the above-mentioned water gel containing polyhydric alcohol further.

[Claim 7] The manufacture approach of the absorptivity ingredient according to claim 5 or 6 characterized by being within the limits whose moisture content in the above-mentioned water gel is 30 % of the weight - 90 % of the weight.

[Claim 8] The manufacture approach of claims 5 and 6 characterized by heating to application of pressure and coincidence so that a temperature gradient may arise in the 1st page of this sheet, and the 2nd page while rolling out the above-mentioned water gel and making it the shape of a sheet, or an absorptivity ingredient given in seven.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to an absorptivity ingredient and its manufacture approach at the absorptivity resin list used suitable for various applications, such as medical ingredients, such as hygienic goods, such as for example, a paper diaper (disposable diaper), and a sanitary napkin, the so-called incontinentia pad, a dew condensation water absorption sheet, water retention material for plantation arts, water cutoff material for engineering works, and a medical sheet, food-grade freshness maintenance material, and a food-grade drip absorber.

[0002]

[Description of the Prior Art] The absorptivity ingredient aiming at making body fluid absorb is broadly used for hygienic goods, such as a recent-years, for example, paper, diaper, and a sanitary napkin, the so-called incontinentia pad, as the component. Generally, the above-mentioned absorptivity ingredient is manufactured by performing processing of embossing etc. to this sheet etc., after performing processing of embossing etc. to this paper etc., or mixing pulp etc. with absorptivity resin, after pinching the absorptivity resin of the shape of the shape of powder, or a particle in paper etc., and creating a sheet, a film, etc. Moreover, using thermoplastics etc. and enclosing absorptivity resin with a base material instead of the above-mentioned processing, is also performed.

[0003] As an approach of fabricating absorptivity resin the shape of a sheet, and in the shape of a film, and manufacturing an absorptivity ingredient, it is Provisional Publication No. After pinching the mixture which comes to mix the absorptivity resin and polyhydric alcohol of the shape of dry powder on the fluororesin sheet which is a base material, the approach of pressurizing this sheet is indicated by 53 No. -141357 official report and U.S. Pat. No. 4,066,583. Moreover, the paper diaper which is an absorptivity article is indicated by the absorptivity ingredient using the dry powder-like absorptivity resin which consists of polyacrylic acid (salt), polysaccharide, etc., and the list at JP,3-174414,A and U.S. Pat. No. 5,145,906.

[0004] Furthermore, aquosity liquid is added, a hydrate is formed in dry powder-like absorptivity resin so that it may become 20 % of the weight - 80% of the weight of AUW, and the approach of fixing this hydrate to a base material by extrusion or spraying is indicated by JP,1-230671,A and U.S. Pat. No. 4,826,880. Moreover, dry powder-like absorptivity resin is fixed to a base material, and the approach of sheet-izing is indicated by U.S. Pat. No. 5,428,076.

[0005]

[Problem(s) to be Solved by the Invention] However, the above-mentioned Provisional Publication No. Once drying, grinding and sifting out the water gel obtained by the polymerization reaction and manufacturing powder-like absorptivity resin, it carries out mixing this absorptivity resin with a base material etc., and is fabricating by the manufacture approach given in 53 No. -141357 official report, U.S. Pat. No. 4,066,583, JP,3-174414,A, and U.S. Pat. No. 5,145,906 the shape of a sheet, and in the shape of a film. Therefore, work environment becomes inferior while handling is difficult, since dust is generated in case absorptivity resin is made into the shape of powder. And the problem of decline in the yield of absorptivity resin, as a result the yield of the mold goods obtained eventually arises. Moreover, it also has the trouble that the production process which manufactures an absorptivity ingredient is complicated, and an absorptivity ingredient cannot be manufactured cheaply.

[0006] In addition, in the above-mentioned conventional manufacture approach, in order to prevent gel blocking of absorptivity resin particles, the amount of the absorptivity resin particle blended into a fibrous matrix must be lessened comparatively. Therefore, it is difficult to manufacture an absorptivity ingredient with comparatively many contents of absorptivity resin.

[0007] Moreover, the absorptivity ingredient obtained by the above-mentioned conventional manufacture approach is deficient in flexibility (flexibility) or reinforcement. For this reason, this absorptivity ingredient cannot be rolled round on a roll etc., or since it is difficult to apply tension (tension), an absorptivity ingredient cannot be manufactured continuously. Furthermore, if hygienic goods (absorptivity article), such as a paper diaper, are manufactured using the above-mentioned absorptivity ingredient, it also has the trouble that the touch (the so-called feeling of software and the so-called usage feeling) of the hygienic goods obtained serves as a defect.

[0008] Moreover, an approach given in JP,1-230671,A, U.S. Pat. No. 4,826,880, and U.S. Pat. No. 5,428,076 also becomes complicated [a compound chemically-modified / of a base material and absorptivity resin powder / degree], while base materials, such as a nonwoven fabric for holding a sheet condition, are required separately in order to sheet-ize once obtaining dry powder-like absorptivity resin. Moreover, it also has the trouble that dust is generated during sheet-izing. And the obtained absorptivity ingredient has the inadequate flexibility of a sheet, a water absorption rate and the absorption scale factor under application of pressure are also small, the absorptivity resin weight per unit area decreases from the firmness of a sheet, and a

water absorption property tends to become inadequate.

[0009] Thus, it is hard to say each absorptivity ingredient obtained by the above-mentioned conventional manufacture approach that various absorption properties and firmness, such as a water absorption rate and an absorption scale factor under application of pressure, are enough. For this reason, much of the absorptivity ingredient which is further excellent in various absorption properties, firmness and flexibility, reinforcement, etc. is expected.

[0010] This invention is made in view of the above-mentioned conventional trouble, and the main object is in providing the absorptivity resin list excellent in various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, with an absorptivity ingredient. Moreover, by simplifying a production process, productivity is raised and it is in this offering the manufacture approach of an absorptivity ingredient that an absorptivity ingredient can be manufactured cheaply.

[0011]

[Means for Solving the Problem] That an invention-in-this-application person etc. should attain the above-mentioned object, as a result of examining an absorptivity ingredient and its manufacture approach wholeheartedly in an absorptivity resin list, by decreasing moisture, pressurizing the water gel of the hydrophilic cross linked polymer While finding out that an absorptivity ingredient could be manufactured cheaply, it finds out excelling in various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, including the absorptivity resin which the absorptivity ingredient obtained swells so that it may have an anisotropy by water absorption, and came to complete this invention.

[0012] That is, the absorptivity resin of invention according to claim 1 is characterized by swelling so that it may have an anisotropy by water absorption, in order to solve the above-mentioned technical problem. For the absorptivity resin of invention according to claim 2, in order to solve the above-mentioned technical problem, it sets to absorptivity resin according to claim 1, and a compression ratio is 2-1,000. It is characterized by being compressed to become within the limits.

[0013] According to the above-mentioned configuration, it excels in various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, and the absorptivity resin used suitable for an absorptivity ingredient can be offered. That is, the hydrophilic cross-linked-polymer particle as absorptivity resin concerning this invention is compressed by an aquosity solvent being desorbed from the three-dimensional network of this water gel particle, in case the water gel particle of for example, the hydrophilic cross linked polymer is pressurized. Therefore, distortion by compression has arisen in the three-dimensional network of this absorptivity resin. For this reason, this absorptivity resin has strain energy inside, and that it should recover in the condition before compression, if it contacts water, it will swell it so that water may be absorbed quickly and it may have an anisotropy. In this invention, a compression ratio expresses the degree of compression of the above-mentioned absorptivity resin. And in order to acquire sufficient improvement effectiveness of absorption properties, such as a water absorption rate and an absorption scale factor under application of pressure, as for the above-mentioned absorptivity resin, it is desirable to be compressed so that a compression ratio becomes above-mentioned within the limits. Thus, the absorptivity resin of this invention is excellent in especially various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, when the force which it is going to recover in the condition before compression works to the structure of cross linkage which was able to be distorted by compression.

[0014] In order to solve the above-mentioned technical problem, the absorptivity ingredient of invention according to claim 3 is characterized by being fabricated in the shape of [of 1,000 or less mgf] a sheet including absorptivity resin according to claim 1 or 2, whenever flexible.

[0015] According to the above-mentioned configuration, since the absorptivity resin of this invention is excellent in especially various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, the absorptivity ingredient containing the above-mentioned absorptivity resin is also excellent in especially various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure. And when the above-mentioned absorptivity ingredient contains polyhydric alcohol, flexibility, reinforcement, cushioning properties, etc. can be raised. Moreover, when the above-mentioned absorptivity ingredient contains a shaping auxiliary material, while the firmness of this absorptivity ingredient becomes much more good, flexibility and reinforcement can be raised further. By the above-mentioned absorptivity ingredient being fabricated in the shape of [of 1,000 or less mgf] a sheet, whenever flexible, this absorptivity ingredient can give the so-called feeling of software, and a good usage feeling to these hygienic goods (absorptivity article), when it excels in flexibility and this absorptivity ingredient is used for hygienic goods (absorptivity article), such as a diaper and a sanitary napkin.

[0016] The absorptivity ingredient of invention according to claim 4 is characterized by swelling so that it may have curvature by water absorption in the absorptivity ingredient according to claim 3, in order to solve the above-mentioned technical problem.

[0017] Even if the absorptivity ingredient of this invention is a plane sheet, it curls so that it may have curvature at the time of water absorption swelling, because said absorptivity resin swells so that it may have an anisotropy that it should recover in the condition before compression. For this reason, when this absorptivity ingredient is used for hygienic goods (absorptivity article), such as a diaper and a sanitary napkin, a shape can be fitted by curling so that this absorptivity ingredient may draw a curve along with a bodily radius of circle at the time of water absorption, and liquid leakage at bulb can be prevented.

[0018] The manufacture approach of the absorptivity ingredient invention according to claim 5 is characterized by decreasing moisture, pressurizing the water gel of the hydrophilic cross linked polymer, in order to solve the above-mentioned technical problem. The manufacture approach of the absorptivity ingredient invention according to claim 6 is characterized by the above-mentioned water gel containing polyhydric alcohol further in the manufacture approach of an absorptivity ingredient according to claim 5, in order to solve the above-mentioned technical problem. The manufacture approach of the absorptivity

ingredient invention according to claim 7 is characterized by being within the limits whose moisture content in the above-mentioned water gel is 30 % of the weight - 90 % of the weight in the manufacture approach of an absorptivity ingredient according to claim 5 or 6, in order to solve the above-mentioned technical problem. The manufacture approach of the absorptivity ingredient invention according to claim 8 is characterized by heating to application of pressure and coincidence so that a temperature gradient may arise in the 1st page of this sheet, and the 2nd page while it rolls out the above-mentioned water gel and makes it the shape of a sheet in the manufacture approach of claims 5 and 6 or an absorptivity ingredient given in seven, in order to solve the above-mentioned technical problem.

[0019] According to the above-mentioned approach, the absorptivity ingredient which is excellent in especially various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, can be offered including the absorptivity resin which has said property. Moreover, while being easy to fabricate in the shape of a sheet because the water gel of the above-mentioned hydrophilic cross linked polymer contains polyhydric alcohol further and being able to obtain a direct sheet-like absorptivity ingredient from water gel by it, the absorptivity ingredient which is excellent in flexibility, reinforcement, cushioning properties, etc. can be obtained. Moreover, a surface cross linking agent can be used together, or configuration mneme can be further raised by specifying mean particle diameter, desiccation mean particle diameter, etc. of the class of principal chain of the moisture content and the amount of meltable components in the water gel of the above-mentioned hydrophilic cross linked polymer, and the hydrophilic cross linked polymer, and water gel.

[0020] And according to the above-mentioned approach, the absorptivity ingredient with which this hydrophilic cross linked polymer was fixed can be manufactured, without once making the water gel of the hydrophilic cross linked polymer, i.e., the water JAPANESE□83856,A] □ resin, into the shape of powder. Therefore, since the various processes of drying, and grinding and sifti become unnecessary, while dust is not generated, handling becomes easy and work environment is improved, a production process is simplified and productivity can be raised. Thereby, an absorptivity ingredient can be manufactured cheaply and easily. And according to the above-mentioned approach, the hydrophilic cross linked polymer, i.e., an absorptivity ingredient with more contents of absorptivity resin than before, can be manufactured.

[0021] Furthermore, since water gel is rolled out and it is made the shape of a sheet while being able to give flexibility and reinforcement to the absorptivity ingredient obtained according to the above-mentioned approach, this absorptivity ingredient can be rolled round on a roll etc., or tension can be applied. Thereby, an absorptivity ingredient can be manufactured continuously.

[0022] Moreover, in case the above-mentioned water gel is rolled out and it is made the shape of a sheet, a difference arises in extent [structure of cross linkage / of said absorptivity resin] of distortion at the 1st page of a sheet, and the 2nd page by heating to application of pressure and coincidence so that a temperature gradient may arise in the 1st page of a sheet, and the 2nd page. For this reason, the stability of absorptivity resin differs by the 1st page of a sheet, and the 2nd page at the time of water absorption and swelling, and this absorptivity ingredient is swollen by making a damp region into the inside, curling so that it may have curvature. Therefore, according to the above-mentioned configuration, when this absorptivity ingredient is used for hygienic goods (absorptivity article), such as a diaper and a sanitary napkin, a shape can be fitted and liquid leakage at bulb can be prevented.

[0023] This invention is explained in detail below. The absorptivity ingredient concerning this invention is characterized by including the absorptivity resin (for example, hydrophilic cross-linked-polymer particle) swollen so that it may have the structure of cross linkage which was able to be distorted and may have an anisotropy by water absorption (different direction swelling). This absorptivity ingredient can be obtained by decreasing moisture, pressurizing the water gel of for example, the hydrophilic cross linked polymer. In this invention, the water gel of the hydrophilic cross linked polymer shows the condition of having swollen when the hydrophilic cross linked polymer absorbed aquosity solvents, such as water. Therefore, the solid content of water gel shows the amount (content) of the hydrophilic cross linked polymer in water gel. Moreover, the water content of an absorptivity ingredient shows the rate of the above-mentioned aquosity solvent contained in this absorptivity ingredient, the hydrophilic cross linked polymer, and this aquosity solvent to the total quantity of polyhydric alcohol. And when an absorptivity ingredient contains the component of a shaping auxiliary material or others, in case the above-mentioned water content is computed, the amount of the component of these shaping auxiliary material or others is not taken into consideration.

[0024] The measuring method of rate of absorption is explained in full detail in the example in the measuring method of water content, the measuring method of the absorption scale factor under application of pressure, and a list. In addition, like the above, the water content defined is a theoretical value and the water content measured in the example is an actual measurement. However, there is almost no difference in both [these] values, therefore it can consider that an actual measurement is the water content defined like the above on parenchyma.

[0025] The water gel of the above-mentioned hydrophilic cross linked polymer can be easily obtained by carrying out the polymerization reaction of the monomer component containing an ethylenic unsaturated monomer, using an aquosity solvent as a solvent. In addition, although water is more desirable as an aquosity solvent, it is not limited especially. Moreover, especially the method of obtaining the water gel of the hydrophilic cross linked polymer is not limited.

[0026] The above-mentioned ethylenic unsaturated monomer has the desirable compound which has water solubility. As an ethylenic unsaturated monomer, specifically For example, an acrylic acid (meta), beta-acryloyloxy propionic acid, Unsaturated carboxylic acid or these neutralization object;2-(meta) acryloyl ethane sulfonic acid, such as a maleic acid, a maleic anhydride, a fumaric acid, a crotonic acid, and an itaconic acid, 2-(meta) acryloyl propane sulfonic acid, a 2-(meta) acrylamide-isobutane sulfonic acid, Anionic monomers or these salts, such as a vinyl sulfonic acid and a styrene sulfonic acid; (meta) Acrylamide, N-permutation (meta) acrylamide, 2-hydroxyethyl (meta) acrylate, 2-hydroxypropyl (meta) acrylate, methoxy polyethylene-glycol (meta) acrylate, The monomer which has the hydrophilic group of the Nonion nature, such as polyethylene-glycol monochrome

(meta) acrylate; N and N-dimethylaminoethyl (meta) acrylate, The monomer which has amino groups, such as N and N-dimethylaminopropyl (meta) acrylate, N, and N-dimethylaminopropyl (meta) acrylamide, or these fourth class salt; is mentioned. These ethylenic unsaturated monomers may be used independently, and may mix two or more kinds suitably, and may be used.

[0027] And if the various absorption properties with which the absorptivity ingredient concerning this invention should be equipped are taken into consideration The acrylic acid (meta) among the ethylenic unsaturated monomers of the above-mentioned instantiation, and its neutralization object 2(hereafter described as acrylic acid (meta) (salt)-(meta) acryloyl ethane sulfonic acid (salt), A 2-(meta) acrylamide-isobutane sulfonic acid (salt), Acrylamide, methoxy polyethylene-glycol (meta) acrylate, (Meta) and N and N-dimethylaminoethyl (meta) acrylate and the fourth class salt of its -- since -- at least one or more kinds of compounds chosen from the becoming group are more desirable, and at least one or more kinds of compounds containing an acrylic acid (meta) (salt) are still more desirable. When an ethylenic unsaturated monomer comes to contain an acrylic acid (meta) (salt) especially, it is most desirable that ** (meta) acrylic-acid [zero mol% - of] and 90-mol % is neutralized by the alkali. Furthermore, when the neutralization index of an acrylic acid (meta) is less than [50 mol %], after carrying out the polymerization reaction of the monomer component, it is desirable to neutralize this polymerization object by the alkali in the state of water gel. That is, as for the hydrophilic cross linked polymer, it is more desirable that a bridge formation Pori (meta) acrylic acid (salt) is included.

[0028] In addition, as the above-mentioned alkali, although a sodium hydroxide, a potassium hydroxide, a sodium carbonate, a sodium hydrogencarbonate, ammonia, ethanolamine, etc. are mentioned, it is not limited especially, for example.

[0029] Moreover, the monomer component may contain an ethylenic unsaturated monomer and other monomers (a copolymer is called hereafter) which can be copolymerized in extent which does not check substantially the hydrophilic property of the hydrophilic cross linked polymer obtained. Specifically as the above-mentioned copolymer, hydrophobic monomers [, such as acrylic ester (meta); vinyl acetate, such as methyl (meta) acrylate, ethyl (meta) acrylate, and butyl (meta) acrylate, and propionic-acid vinyl,]; etc. is mentioned. These copolymers may be used independently, and may mix two or more kinds suitably, and may be used.

[0030] The water gel of the hydrophilic cross linked polymer concerning this invention is obtained by carrying out the polymerization reaction of the above-mentioned monomer component using an aquosity solvent. the time of the polymerization initiation in the above-mentioned polymerization reaction -- for example, a polymerization initiator or a radiation and an electron ray, ultraviolet rays, and electromagnetism -- activity energy lines, such as a line, etc. can be used. Specifically as the above-mentioned polymerization initiator, radical polymerization initiators, such as azo compound [, such as a - azobis (2-amidinopropane) or its salt, and organic peroxide;2, such as inorganic peroxide;t-butyl hydroperoxide /, such as potassium persulfate, ammonium persulfate, sodium persulfate, and a hydrogen peroxide, /, benzoyl-peroxide, and cumene hydroperoxide, 2'-azobis (N and N'-dimethylene isobutyl amidine) or its salt, 2, and 2 '4, 4'-azobis-4-cyano valeric acid];, are mentioned. It may package-add or division add, and these polymerization initiators may be used independently, and may use two or more kinds together. Moreover, when using a peroxide as a polymerization initiator, reducing agents, such as a sulfite, a bisulfite, and L-ascorbic acid, may be used together, and redox polymerization may be performed.

[0031] The amount of these polymerization initiators used receives a monomer component. 0.001 % of the weight - 5% of the weight of within the limits is desirable, and 0.01 % of the weight - 1% of the weight of within the limits is more desirable. The amount of the polymerization initiator used When fewer than 0.001 % of the weight, since the effectiveness of using a polymerization initiator is scarce, it is not desirable. Moreover, even if it uses a polymerization initiator exceeding 5 % of the weight, since the further effectiveness cannot be expected, but the average molecular weight of the hydrophilic cross linked polymer obtained moreover falls as compared with the case where it is used within the limits of the above and shape memory becomes inadequate, it is not desirable. In addition, especially the polymerization method of a monomer component is not limited.

[0032] As for the hydrophilic cross linked polymer, it is desirable that the bridge is constructed over the interior the cross linking agent which has two or more polymerization nature partial saturation radical and/or two or more reactant radicals, a reaction, or by carrying out copolymerization so that an absorptivity ingredient can be equipped with a desired absorption property. That is, shape memory is attained by the hydrophilic cross linked polymer being equipped with the network structure of three dimensions. Although the above-mentioned hydrophilic cross linked polymer may be a self-bridge formation mold which does not need a cross linking agent, it is more desirable to use a cross linking agent.

[0033] The above-mentioned cross linking agent is not limited especially that what is necessary is just the ethylenic unsaturated monomer which a monomer component contains or its polymer, and the compound in which a reaction is possible. As a cross linking agent, specifically For example, tetra-ant ROKISHI ethane, N, and N'-methylenebis (meta) acrylamide, Ethylene GURIKORUJI (meta) acrylate, GURISERINTORI (meta) acrylate, (Pori) TORIMECHI roll pro pantry (meta) acrylate, a triaryl amine, A triaryl SHIANU rate, triallyl isocyanurate, glycidyl (meta) acrylate, Ethylene glycol, a diethylene glycol, a glycerol (Pori), (Pori) Propylene glycol, diethanolamine, trimethylol propane, Pentaerythritol, ethylene glycol diglycidyl ether (Pori), (Pori) Glycerol polyglycidyl ether, epichlorohydrin, ethylenediamine, polyethyleneimine, an aluminum chloride (Pori), an aluminum sulfate, a calcium chloride, magnesium sulfate, etc. are mentioned. In consideration of the reactivity, after the time of a polymerization, or a polymerization, these cross linking agents may be used independently, and may use two or more kinds together. It is more desirable to mix with a monomer component and to use at least, a kind of cross linking agent chosen from the group which consists of triaryl amine, tetra-ant ROKISHI ethane, N, and N'-methylenebis (meta) acrylamide, ethylene (Pori) GURIKORUJI (meta) acrylate, and TORIMECHI roll pro pantry (meta) acrylate also in using the cross linking agent which has

two or more polymerization nature machines among the cross linking agents of the above-mentioned instantiation.

[0034] The amount of these cross linking agents used receives a monomer component. 0.001-mol % - two-mol% of within the limits is desirable, and 0.01-mol % - one-mol% of within the limits is more desirable. The amount of the cross linking agent used When fewer than 0.001-mol %, water gel is crushed at the time of compression, and there is a case where it becomes impossible to have a desired absorption property. On the other hand, when there is more amount of the cross linking agent used than two-mol %, compression of water gel is difficult, and since it becomes impossible to equip the absorptivity ingredient obtained with a desired absorption property, it is not desirable.

[0035] Furthermore, the polymerization reaction of the monomer component may be carried out under existence of hydrophilic macromolecules, such as starch, a cellulose, a chitin, polyvinyl alcohol, polyacrylic acid (salt), and the bridge formation object, a polyethylene glycol. Thereby, the reaction which forms graft association and complex advances in parallel to the polymerization reaction of a monomer component. That is, the hydrophilic cross linked polymer in which graft association and complex were formed between the polymerization object of a monomer component and the hydrophilic macromolecule can be obtained.

[0036] Especially the polymerization method that carries out the polymerization of the monomer component is not limited, and various well-known polymerization methods, such as an aqueous polymerization method and an opposite phase suspension-polymerization method, can be used for it. How to put in and carry out the polymerization of the water solution of a monomer component into predetermined shattering as the above-mentioned aqueous polymerization method, for example; while carrying out the polymerization of the water solution of a monomer component, using mixers, such as a kneader having the stirring aerofoil which has a predetermined configuration, as polymerization equipment, approach; which subdivides the water gel of the hydrophilic cross linked polymer to generate by the shearing force of this stirring aerofoil is mentioned. When a polymerization reaction is completed by the latter approach among these approaches, since particle-like water gel is obtained, it is more desirable.

[0037] And when the water gel obtained using an aqueous polymerization method is massive, it is more desirable to crack this water gel in the shape of [which has predetermined particle diameter] a particle. Especially the crack approach that cracks water gel in the shape of a particle is not limited, and the various crack approaches that the method of applying shearing force to water gel etc. is well-known can be used for it. as suitable equipment to apply shearing force to water gel -- concrete -- for example, screw die pressing appearance machines, such as a meat chopper, -- although kneaders, such as; various cutter; (machine application of pressure) kneaders, an internal mixer, and a Banbury mixer, etc. are mentioned, it is not limited especially.

[0038] Moreover, the approach of making a hydrophobic organic solvent suspend the water solution of a monomer component, and carrying out a polymerization under existence of a dispersant, as the above-mentioned opposite phase suspension-polymerization method, for example etc. is mentioned. Water gel [being spherical (the shape of a particle)] is obtained without cracking, when a polymerization reaction is completed by adopting an opposite phase suspension-polymerization method.

[0039] The hydrophilic cross linked polymer will be in the gel state, if it swells by absorbing an aquosity solvent and the rate (a moisture content is called hereafter) of this aquosity solvent to the total quantity of this hydrophilic cross linked polymer and an aquosity solvent becomes about 30% of the weight or more. That is, the moisture content of the water gel of the hydrophilic cross linked polymer concerning this invention is 40 % of the weight - 80% of the weight of within the limits more preferably about 30% of the weight or more 30 % of the weight - 90% of the weight of within the limits. These moisture contents may be adjusted by the monomer concentration before a polymerization, and may be adjusted by performing adding after mixing of desiccation thru/or an aquosity solvent as occasion demands after a polymerization.

[0040] Since the hydrophilic cross linked polymer will not be in the gel state when there are few above-mentioned moisture contents than about 30 % of the weight, it becomes difficult to roll out this hydrophilic cross linked polymer. That is, the hydrophilic cross linked polymer (water gel) is upright, and when rolling out this hydrophilic cross linked polymer, it becomes difficult to fully compress one grain of absorptivity one-grain resin, i.e., a hydrophilic cross-linked-polymer particle, until distortion will be given [flat].

[0041] Moreover, when there are more moisture contents than 90 % of the weight, while the handling nature of water gel falls, it becomes difficult to roll out this water gel. In this case, since the gel strengths of this water gel run short, the hydrophilic cross-linked-polymer particle as absorptivity resin is not distorted in case this water gel loses moisture and is compressed, but it is only crushed, there is a possibility that it may become impossible to make the original configuration recover the above-mentioned absorptivity resin by water absorption. That is, shape memory becomes difficult. Therefore, since the rate of absorption for which it asks, the absorption scale factor under application of pressure, etc. may not no longer be obtained, it is not desirable. in addition -- the time of swelling according [in this application, with shape memory, where the hydrophilic cross-linked-polymer particle as absorptivity resin is distorted, are fixed, and] to water absorption -- un--- the condition of swelling in an analog and returning to the configuration before application of pressure (compression) is shown. the above-mentioned absorptivity resin -- un--- swelling in an analog (different direction swelling) is quite obvious if the configuration of the absorptivity resin after compression is compared with the configuration of this absorptivity resin after water absorption and swelling.

[0042] And the above-mentioned water gel can absorb further aquosity liquids, such as drip (juice); which oozes from food, such as body fluid; meat and fish, such as water; urine and menstrual blood, vegetables, and fruit. That is, if water gel contacts an aquosity liquid, it will absorb and swell this aquosity liquid and will cause the further cubical expansion. As for water gel, it is desirable to have the capacity which absorbs the aquosity liquid more than the at least 3 time weight of a self-weight (weight of water gel).

[0043] As for water gel, it is desirable that it is a particle-like. Especially the configuration of this particle, i.e., the absorptivity

resin at the time of water absorption, is not limited, and can have various configurations, such as the shape of the shape of a cube, and a polyhedron, a globular shape, disc-like, and a corner guard, a cylinder, a needle, fibrous, the shape of a flake (flake), and an indeterminate configuration (irregular configuration). Furthermore, the above-mentioned water gel may be a primary particle, and may be the floc (aggregated particle) which the primary particle condensed. An indeterminate configuration with the irregular particle diameter pass the grinding process among these configurations, or the shape of a ball acquired by the opposite phase suspension polymerization is desirable.

[0044] Although the above-mentioned water gel may have far-reaching particle size distribution, it is desirable to have the particle size distribution of the predetermined range and predetermined mean particle diameter. and mean particle diameter (desiccation mean particle diameter is called hereafter), i.e., the mean particle diameter of the hydrophilic cross linked polymer, when water gel dries this water gel -- within the limits of 50 micrometers - 2,000 micrometer -- more -- desirable -- within the limits of 60 micrometers - 1,500 micrometer -- especially -- desirable -- within the limits of 80 micrometers - 1,000 micrometer -- most -- desirable -- It is more desirable to have mean particle diameter which becomes within the limits of 100 micrometers - 600 micrometer.

[0045] Moreover, as for water gel, it is desirable that particle diameter does not contain the particle 5mm or more substantially, and it is more more desirable still that particle diameter does not contain the particle 3mm or more substantially so that the so-called feeling of software, a good usage feeling, and aesthetic property can be given to an absorptivity ingredient and an absorptivity article. Desiccation mean particle diameter As for the water gel exceeding 2,000 micrometers, when the smoothness of aesthetic property or a front face is missing, the surface area per unit weight of this water gel becomes comparatively small. Therefore, since the rate of absorption of the absorptivity ingredient obtained becomes small, it is not desirable. Since the handling nature and dipping nature of this water gel fall, the water gel with desiccation mean particle diameter smaller than 50 micrometers is not desirable.

[0046] After classifying water gel, it can ask for the above-mentioned desiccation mean particle diameter by converting by the following approaches. That is, first, the beaker (container) of predetermined magnitude is laid on a magnetic stirrer, and 1,200g of 20-% of the weight water solutions of a sodium chloride is put into this beaker. Next, rotator in a beaker after supplying water gel 25g of solid content alpha weight % which asks for measurement of particle diameter to this water solution Water gel is distributed by making it rotate by 300 rpm. After stirring for 60 minutes, six plus sieves (that is, plus sieve of the maximum upper case) accumulated in order of the fineness of an opening are filled with these dispersion liquid. The six above-mentioned opening-of-sieve apertures r_n It is referred to as $r_1 = 0.075\text{mm}$, $r_2 = 0.30\text{mm}$, $r_3 = 0.60\text{mm}$, $r_4 = 0.85\text{mm}$, $r_5 = 2.0\text{mm}$, and $r_6 = 9.5\text{mm}$ from lower at order. Furthermore, it is the 20-% of the weight water solution of a sodium chloride to the plus sieve of the maximum upper case. Homogeneity is slowly filled with 6,000g. This classifies water gel.

[0047] Then, after fully draining off water from the water gel classified by each screen, the weight of this water gel is measured, respectively. And the sum of the weight of each water gel, i.e., the AUW of water gel from which it classified and drained off water, is set to W (g). And a degree type and $R_n = [[(\alpha/100)] \text{ and } [\text{ and }](25/W)]^{1/3} \text{ xrn}$ are followed, and it is the above-mentioned opening r_n . Opening R_n which corresponds when it is assumed that the dried water gel was classified It converts into (mm). Moreover, the rate (% of the weight) to AUW W of the weight of the water gel which remained in each plus sieve is computed, respectively.

[0048] next, a logarithm -- a probability paper -- the above-mentioned opening R_n Opening r_n used for conversion of each opening R_n (that is, R_1, R_2, R_3, R_4, R_5 , and R_6) The rate of the water gel which remained in the plus sieve which it has is plotted. And opening R from which the rate of the weight of water gel to AUW W becomes 50 % of the weight is read in the graph obtained by this plot, and it considers as the mean particle diameter (mm) of the water gel which dried this value. Thereby, the above-mentioned desiccation mean particle diameter is called for.

[0049] moreover, the above-mentioned water gel -- a water melttable component -- 20 or less % of the weight -- desirable -- It is desirable to contain still more preferably by 1 % of the weight - 15% of the weight of within the limits 0.1 % of the weight - 20% of the weight of within the limits. If the content of the above-mentioned water melttable component exceeds 20 % of the weight, since the gel strength of this water gel will become inadequate, it is not desirable. Moreover, the content of the above-mentioned water melttable component may become inadequate [an absorption scale factor or rate of absorption] at less than 0.1 % of the weight.

[0050] Furthermore, as for the conversion of the above-mentioned water gel, it is desirable that it is 90% - 99.99% of within the limits. While causing lowering of physical properties in case moisture is decreased if the conversion of the above-mentioned water gel is less than 90%, there is a possibility that the above-mentioned shape memory may become difficult.

[0051] By this invention, configuration mneme can be further raised by specifying mean particle diameter, desiccation mean particle diameter, etc. of the class of principal chain of the moisture content and the amount of melttable components in the above-mentioned water gel, and the hydrophilic cross linked polymer, and water gel.

[0052] In case the absorptivity ingredient concerning this invention is obtained, it is desirable that the above-mentioned water gel contains polyhydric alcohol further. As the above-mentioned polyhydric alcohol, specifically For example, ethylene glycol, a diethylene glycol, propylene glycol, Triethylene glycol, tetraethylene glycol, a polyethylene glycol, 1,3-propanediol, dipropylene glycol, 2 and 2, 4-trimethyl -1, 3-pentanediol, A polypropylene glycol, a glycerol, polyglycerin, 2-butene-1, 4-diol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, 1, 2-cyclohexane dimethanol, 1, 2-cyclohexanol, Trimethylol propane, diethanolamine, triethanolamine, Although polyoxypropylene, an oxyethylene-oxypropylene block copolymer, pentaerythritol, a desiccation mean particle diameter, etc. of the class of principal chain of the moisture content and the amount of melttable compo polyhydric alcohol may be used independently, and may mix two or more kinds suitably, and may be used. Especially a glycerol is

desirable among the polyhydric alcohol of the above-mentioned instantiation.

[0053] The absorptivity ingredient which was easy to fabricate in the shape of a sheet because the above-mentioned water gel contains polyhydric alcohol further, and was excellent in it at flexibility, or reinforcement and cushioning properties can be obtained. And when this absorptivity ingredient contacts water, it becomes easy to restore absorptivity resin, i.e., a hydrophilic cross-linked-polymer particle, to the configuration before application of pressure. That is, the above-mentioned configuration mneme can be raised.

[0054] The rate of this polyhydric alcohol to the total quantity (the total quantity is only called hereafter) of the solid content of the above-mentioned water gel and polyhydric alcohol and 0.1 % of the weight - 80% of the weight of within the limits are desirable, 1 % of the weight - 60% of the weight of within the limits is more desirable, and 5 % of the weight - 30% of the weight of within the limits is still more desirable. It is easy to fabricate in the shape of a sheet by using polyhydric alcohol within the limits of the above, and moreover, while water gel becomes is easy to be cracked, the flexibility and reinforcement of an absorptivity ingredient (tensile strength, tearing strength, etc.) improve. The rate of polyhydric alcohol to the total quantity When fewer than 0.1 % of the weight, the effectiveness by using this polyhydric alcohol is scarce, and since neither flexibility nor reinforcement can be given to an absorptivity ingredient, it is not desirable. On the other hand, when there are more rates of polyhydric alcohol to the above-mentioned total quantity than 80 % of the weight, while the amount of this polyhydric alcohol used increases too much and an absorptivity ingredient is sticky, since the various absorption properties of this absorptivity ingredient fall, it is not desirable. In addition, the especially mixed approach of water gel and polyhydric alcohol, i.e., the preparation approach of the mixture (it is only hereafter described as mixture) of water gel and polyhydric alcohol, is not limited.

[0055] Moreover, in case the above-mentioned water gel is pressurized, surface bridge formation (secondary bridge formation) may be further introduced into the hydrophilic cross linked polymer by adding a surface cross linking agent. The well-known surface cross linking agent generally used for this application can be used for the above-mentioned surface cross linking agent that what is necessary is just functional groups, such as a carboxyl group which has two or more reactant radicals and the hydrophilic cross linked polymer has, and the compound which reacts.

[0056] As the above-mentioned surface cross linking agent, specifically For example, ethylene glycol, A diethylene glycol, propylene glycol, triethylene glycol, Tetraethylene glycol, a polyethylene glycol, 1,3-propanediol, Dipropylene glycol, 2 and 2, 4-trimethyl -1, 3-pentanediol, A polypropylene glycol, a glycerol, polyglycerin, 2-butene-1, 4-diol, 1,4-butanediol, 1,5-pentanediol, 1,6-hexanediol, 1, 2-cyclohexane dimethanol, 1, 2-cyclohexanol, Trimethylol propane, diethanolamine, triethanolamine, Polyoxypropylene, an oxyethylene-oxypropylene block copolymer, Pentaerythritol, a sorbitol, polyvinyl alcohol, a glucose, Polyhydric alcohol, such as mannite, cane sugar, and grape sugar; Ethylene glycol diglycidyl ether, Polyethylene glycol diglycidyl ether, glycerol polyglycidyl ether, Diglycerol polyglycidyl ether, polyglycerol polyglycidyl ether, Multiple-valued epoxy compounds, such as propylene glycol diglycidyl ether and polypropylene glycol diglycidyl ether; Ethylenediamine, Diethylenetriamine, triethylenetetramine, tetraethylenepentamine, Multiple-valued amine compounds, such as pentaethylhexamine and polyethyleneimine; 2, 4-tolylene diisocyanate, Multiple-valued isocyanate compounds, such as hexamethylene di-isocyanate; Multiple-valued oxazoline compound; 1, such as 1 and 2-ethylene bis-oxazoline, 3-dioxolane-2-ON, The 4-methyl -1, 3-dioxolane-2-ON, 4, the 5-dimethyl -1, 3-dioxolane-2-ON, The 4 and 4-dimethyl -1, 3-dioxolane-2-ON, 4-ethyl -1, 3-dioxolane-2-ON, 4-hydroxymethyl -1, 3-dioxolane-2-ON, 1, 3-dioxane-2-ON, The 4-methyl -1, 3-dioxane-2-ON, 4, the 6-dimethyl -1, 3-dioxane-2-ON, Alkylene carbonate compounds, such as 1 and 3-dioxo pan-2-ON; Epichlorohydrin, Halo epoxy compounds, such as EPIBUROMUHI drine compounds and alpha-methyl epichlorohydrin; although polyvalent metal compound [, such as a hydroxide of polyvalent metal, such as zinc, calcium, magnesium, aluminum, iron, and a zirconium, and a chloride,]; etc. is mentioned, it is not limited especially. These surface cross linking agent may be used independently, and may use two or more kinds together. Also in these surface cross linking agent, a multiple-valued epoxy compound is desirable.

[0057] Thus, the absorption scale factor under the application of pressure of configuration mneme or an absorptivity ingredient improves further by introducing surface bridge formation into the hydrophilic cross linked polymer using a surface cross linking agent. Moreover, various absorption properties, such as the diffusibility of this aquosity liquid at the time of absorbing an aquosity liquid and dipping nature, improve. Furthermore, when an aquosity liquid is contacted, the amount of the component eluted into this aquosity liquid, i.e., the so-called water meltable component, can be reduced.

[0058] although the amount of the above-mentioned surface cross linking agent used is not the class of surface cross linking agent to be used, combination, and the thing limited especially that what is necessary is just to set up suitably according to the degree of the surface bridge formation for which it asks etc. -- 0 - 10% of the weight of within the limits -- desirable -- It is 0.01 % of the weight - 1% of the weight of within the limits still more preferably 0.001 % of the weight - 5% of the weight of within the limits.

[0059] Moreover, especially the mixed approach of the above-mentioned water gel or mixture, and a surface cross linking agent is not limited. By heating, in case the above-mentioned water gel is pressurized, crosslinking reaction of the hydrophilic cross linked polymer and a surface cross linking agent can be advanced further.

[0060] Application of pressure and in case it rolls out preferably, a shaping auxiliary material can be used for water gel if needed. That is, the absorptivity ingredient may contain the shaping auxiliary material other than water gel and polyhydric alcohol if needed. As this shaping auxiliary material, various insoluble particles etc. are mentioned to a surfactant, fiber, and water, for example. These shaping auxiliary material may be used independently, and may use two or more kinds together. When forming an absorptivity ingredient in the shape of a sheet, it is desirable that this absorptivity ingredient contains fiber.

[0061] As the above-mentioned surface active agent, an anion system surface active agent, the Nonion system surface active agent, a cation system surface active agent, an amphoteric surface active agent, etc. are mentioned. As an anion system surfactant, although alkylbenzene sulfonates, such as alkyl-sulfuric-acid ester salts, such as fatty-acid salts, such as sodium oleate and castor

oil potash, sodium lauryl sulfate, and a lauryl ammonium sulfate, and sodium dodecylbenzenesulfonate, alkylnaphthalenesulfonate, dialkyl sulfo succinate, alkyl phosphate, a naphthalene sulfonic-acid formalin condensate, a polyoxyethylene alkyl-sulfuric-acid ester salt, etc. are mentioned, specifically, it is not limited especially. As an Nonion system surface active agent, although polyoxyethylene alkyl ether, the polyoxyethylene alkylphenol ether, polyoxyethylene fatty acid ester, a sorbitan fatty acid ester, polyoxyethylene sorbitan fatty acid ester, polyoxyethylene alkylamine, an oxyethylene-oxypropylene block copolymer, etc. are mentioned, specifically, it is not limited especially. As a cation system surfactant, although quaternary ammonium salt, such as alkylamine salts, such as lauryl amine acetate and stearyl amine acetate, lauryl trimethylammonium chloride, and stearyl trimethylammonium chloride, etc. is mentioned, specifically, it is not limited especially. As an amphionic surface active agent, although lauryl dimethylamine oxide etc. is mentioned, specifically, it is not limited especially. These surfactants may be used independently and may use two or more kinds together. By using a surfactant, the above-mentioned mixture can be rolled out still more easily according to the shape of a sheet.

[0062] The above-mentioned fiber may be any of continuous glass fiber and a staple fiber. As fiber, although inorganic fibers, such as synthetic fibers, such as natural fibers, such as timber fiber, such as pulp, and hemp, and polyester, and a glass fiber, etc. are mentioned, especially the construction material is not limited, for example. Moreover, as polyester, polyethylene terephthalate (PET) etc. is mentioned, for example. These fiber may be used independently and may use two or more kinds together. Also in these fiber, a synthetic fiber, especially a hydrophobic synthetic fiber are desirable. Moreover, the paper (Japanese paper) which consists of these fiber, yarn, textile fabrics, a nonwoven fabric, etc. can also be used. While being able to enlarge further rate of absorption of the absorptivity ingredient obtained by using fiber, firmness can be raised further. Moreover, in forming an absorptivity ingredient in the shape of a sheet, it makes what the thickness is made much more thin for (for example, about several mm). In addition, it is more desirable to use a 20mm - about 30mm staple fiber more preferably 10mm - 40mm die length of 2mm - 50mm so that fiber may not be involved in the stirring aerofoil of a kneading machine when kneading water gel, or mixture and fiber using a kneading machine.

[0063] Specifically as the above-mentioned particle, mean particle diameter, such as clay mineral;200 (trade name: product made from Japanese Aerosil, Inc.) similar to a mica, pyrophyllite, a kaolinite, a hulsite, and these inorganic substances, for example, Aerosil, and Carplex #80 (trade name: Shionogi & Co., Ltd. make), is mentioned for silica (silicon dioxide); carbon black 50 micrometers or less, activated carbon, etc. These particles may be used independently and may use two or more kinds together.

[0064] That what is necessary is just to set up suitably according to a class, combination, etc. of the shaping auxiliary material to be used, the amount of the shaping auxiliary material used is the solid content (that is, hydrophilic cross linked polymer) of water gel, for example, although not limited especially. As opposed to the 100 weight sections the total quantity of a shaping auxiliary material -- within the limits of the 0.01 weight section - 100 weight section -- desirable -- within the limits of 0.1 weight sections - 50 weight section -- more -- desirable -- What is necessary is just to set up so that it may become within the limits of 0.1 weight sections - 30 weight section. The amount of the shaping auxiliary material used In exceeding the 100 weight sections, the absorptivity ingredient obtained tends to become comparatively hard. In addition, neither the mixed approach of the mixture of water gel or water gel, and polyhydric alcohol and a shaping auxiliary material nor especially mixed conditions are limited.

[0065] Especially the application-of-pressure approach that pressurizes the above-mentioned water gel is not limited, and well-known various approaches can be used for it. Moreover, pressurizing as a pressurizer used, in case it pressurizes, the equipment which can decrease the moisture (amount of an aquosity solvent) of water gel (evaporation) is suitable, and the equipment which can be rolled out and can be further made into the shape of a sheet is the optimal. As the above-mentioned pressurizer, although the drum dryer which put the compression equipment side by side is mentioned, specifically, it is not limited especially. In case the above-mentioned water gel is pressurized, the absorptivity ingredient which memorized the configuration before application of pressure can be obtained by decreasing the moisture of water gel to application of pressure and coincidence, and pressing an absorptivity ingredient into them.

[0066] It is (i) in order to decrease the moisture of water gel to application of pressure and coincidence. How (iii) for it to be immersed in a hydrophilic organic solvent and to remove moisture while carrying out the approach of decompressing below at a room temperature and decreasing moisture while compressing, and (ii) application of pressure, The approach of heating etc. is maleic acid, a maleic anhydride, a fumaric acid, a crotonic acid, and an itaconic ac

[0067] In this case, the dielectric heating by the radiation intermediary thermal type heating approach by the hot blast heat transfer mold heating approach by the thermal conduction mold heating approach and ** heating air which heat water gel by making it contact the heating surface of ** heat source and directly as the above-mentioned heating approach, for example, a steam, etc., ** infrared radiation, far infrared rays, etc., ** microwave, etc. chooses suitably, and it is used. Also in it, the ** thermal conduction mold heating approach of having used the heating plate, the heating drum, the heating roller, the heating belt, etc. is desirable, and especially the approach of pressurizing the heating surface in an absorptivity ingredient, i.e., the heating surface of water gel, at heating and coincidence, combining a plate, a drum, a roller, a belt, etc. two or more is desirable.

[0068] Moreover, when adopting the approach of the above-mentioned **, the heating surface (the 1st page) which is the contact surface with heating apparatus, and its rear face, i.e., the 1st page, may give the difference of distortion to the structure of cross linkage of absorptivity resin by pressurizing the heating surface of the above-mentioned water gel at heating and coincidence so that a temperature gradient may arise in respect of objection of the thickness direction of water gel (the 2nd page). Since the stability (configuration mneme) of absorptivity resin differs by the 1st page (that is, heating surface) of a sheet, and the 2nd page (for example, a non-heating surface or a low-temperature side) at the time of water absorption and swelling, it can be made to curl so that it may have curvature when obtaining a sheet-like absorptivity ingredient by the above-mentioned approach, being able to use a low temperature range as the inside for the sheet absorptivity ingredient of the above. The sheet absorptivity ingredients of

the above are 1 time to 50 times of the weight of the hydrophilic cross linked polymer, and absorbing 5 times to 20 times still more preferably twice to 25 times preferably about a physiological saline, and the ends curl. Although this phenomenon happens irrespective of the magnitude of a sheet, it can check easily visually, for example by absorbing water and making the sheet of 1cm - 10cm around swell.

[0069] Next, it explains briefly [below] about an example of the application-of-pressure approach of the water gel (water gel constituent) using the drum dryer which put the compression equipment side by side, i.e., the rolling approach, referring to drawing 1. In addition, the application-of-pressure approach of water gel is not limited only to the approach using the drum dryer which put the compression equipment side by side.

[0070] The above-mentioned drum dryer is an unvented system single drum dryer, and the drum dryer (single drum dryer) which put the compression equipment side by side is equipped with the dryer drum 1, the application-of-pressure roller 2 as a compression equipment, the scraper 3, the driving gear that is not illustrated as shown in drawing 1. The dryer drum 1 consists of stainless steel etc., for example, is a number. Revolution actuation is carried out in the direction of arrow-head A at the rotational frequency below rpm. Moreover, the heating apparatus which can heat this dryer drum 1 front face to predetermined temperature and which is not illustrated is built in the dryer drum 1.

[0071] The application-of-pressure roller 2 consists of stainless steel etc., and it is arranged so that predetermined spacing, i.e., a clearance, may be formed between dryer drum 1 front faces. Moreover, the application-of-pressure roller 2 carries out revolution actuation in the direction of arrow-head B at the predetermined rotational frequency corresponding to the rotational frequency of the dryer drum 1. And the application-of-pressure roller 2 can apply a predetermined pressure now to dryer drum 1 front face to the water gel constituent 10 (it mentions later) as mixture by which feed was carried out. That is, a drum dryer decreases the moisture of water gel, pressurizing the water gel constituent 10.

[0072] The scraper 3 is contacted by dryer drum 1 front face, and has come to scratch the sheet 11 (it mentions later) currently stuck on this front face. In addition, as for dryer drum 1 front face and application-of-pressure roller 2 front face, mirror finish is made. Moreover, the heating apparatus which can heat this application-of-pressure roller 2 front face to predetermined temperature may be built in the application-of-pressure roller 2.

[0073] In the above-mentioned configuration, feed of the water gel constituent 10 which becomes the upstream of the application-of-pressure roller 2 put side by side to the dryer drum 1 from a shaping auxiliary material first water gel, polyhydric alcohol, and if needed is carried out. Then, this water gel constituent 10 is in the condition adhering to dryer drum 1 front face, is conveyed in the direction of arrow-head A, and arrives at the clearance between the dryer drum 1 and the application-of-pressure roller 2.

[0074] Then, with the application-of-pressure roller 2, 15% or less of thick Mino in the condition that the thickness is not pressurizing, the water gel constituent 10 is pressurized so that it may become 5% or less more preferably (rolling), and let it be a sheet 11 10% or less preferably. And this sheet 11 is heated by the above-mentioned heating apparatus through this dryer drum 1 front face, being conveyed in the direction of arrow-head A in the condition of having stuck on dryer drum 1 front face. the temperature of dryer drum 1 front face, i.e., the heating temperature of the water gel constituent 10, has desirable room temperature (ordinary temperature) - 300 degree C, and it is more desirable -- 100 degree C to 180 degree C is still more desirable. [of 50 degrees C - 200 degree C] Heating temperature When exceeding 300 degrees C, since the hydrophilic cross linked polymer, disassembly of polyhydric alcohol, etc. arise, it is not desirable. The moisture (amount of an aquosity solvent) decreases by heating a sheet 11, i.e., water gel. In addition, some polyhydric alcohol may evaporate by being heated.

[0075] On the basis of the amount of the aquosity solvent before pressurizing, 10 % of the weight - 90% of the weight of within the limits, more preferably, the percentage reduction of the aquosity solvent in water gel is not 40 % of the weight - 80% of the weight of within the limits, then the thing limited especially, although it is good. In addition, when not heating the water gel constituent 10 (i.e., when the temperature of dryer drum 1 front face is a room temperature), percentage reduction is about 0 % of the weight. When there is little moisture reduction and shape memory decreases moisture thoroughly difficult (0% of moisture contents of water gel), there is a possibility that many physical properties and flexibility may fall.

[0076] Moreover, in case the above-mentioned water gel constituent 10 is pressurized, in order to make shape memory possible, it is desirable to pressurize extent which does not subdivide water gel (destruction). As for the above-mentioned water gel, for that, it is desirable to be beforehand subdivided so that it may become the particle size mentioned above.

[0077] Subsequently, after a sheet 11 is further conveyed in the direction of arrow-head A, it is scratched from dryer drum 1 front face by the scraper 3. The scratched sheet 11, i.e., an absorptivity ingredient, is rolled round by the roll which is not illustrated if needed. in addition, the time of being scratched by the scraper 3, since the absorptivity ingredient is equipped with moderate flexibility and reinforcement by polyhydric alcohol being included -- for example, about 90 degrees -- further -- It does not break, even if bent by 180 degrees. moreover, an absorptivity ingredient -- tension (tension) -- in addition, a sheet 11 can also be torn off from dryer drum 1 front face. Thereby, the absorptivity ingredient of the shape of a sheet at least with smooth one side is obtained.

[0078] In this invention, the rate of absorption of the absorptivity ingredient obtained by decreasing the moisture and the absorption scale factor under application of pressure can be raised as mentioned above, pressurizing water gel. When the absorptivity ingredient of the shape of this powder is generally once fabricated for example, in the shape of a sheet after obtaining a powder-like absorptivity ingredient, the absorption scale factor and rate of absorption under the application of pressure of the absorptivity ingredient obtained fall substantially as compared with the absorptivity ingredient before shaping. For this reason, it was difficult to obtain conventionally the absorptivity ingredient as mold goods which are excellent in the absorption scale factor and rate of absorption under application of pressure. However, according to this invention, it is possible to carry out direct

shaping (sheet-izing), for example from water gel, there is nothing to the former, and the mold goods (for example, sheet-like absorptivity ingredient) of a high value can be obtained.

[0079] The rate of absorption of the absorptivity ingredient as mold goods concerning this invention is 150. It is by being below a second and specifying mean particle diameter, desiccation mean particle diameter, etc. of the class of principal chain of the moisture content and the amount of meltable components in concomitant use of a surface cross linking agent, or the above-mentioned water gel, and the hydrophilic cross linked polymer, and water gel. The high rate of absorption for 30 or less seconds can take 50 or less seconds preferably especially 100 or less seconds. however, the above-mentioned water absorption rate -- 1 or less second -- especially -- When it is 0.5 or less seconds, a water absorption rate is too quick, and since there is a possibility that diffusion of liquid may fall, it is not desirable.

[0080] Moreover, especially the absorption scale factor under application of pressure is more than 15 g/g, and a surface cross linking agent can be used together, or it can be more preferably made into the high scale factor more than 25 g/g more than 20 g/g by the absorption scale factor of the absorptivity ingredient as mold goods concerning this invention, and specifying mean particle diameter, desiccation mean particle diameter, etc. of the class of principal chain of the moisture content and the amount of meltable components in the above-mentioned water gel, and the hydrophilic cross linked polymer, and water gel.

[0081] According to this invention, in this way, water gel can be pressurized and the absorptivity ingredient which is excellent in especially the absorption scale factor under application of pressure decreasing the moisture of this water gel at a water absorption rate list compared with the conventional absorptivity ingredient can be obtained.

[0082] That is, in case the water gel of the hydrophilic cross linked polymer is pressurized, distortion by application of pressure arises in this three-dimensional network by an aquosity solvent being desorbed from the three-dimensional network of this water gel particle. For this reason, by pressurizing the above-mentioned water gel constituent 10 containing this water gel, as shown in drawing 2 (a), the absorptivity resin 30 as a water gel particle, i.e., a gel hydrophilic cross-linked-polymer particle, is extended so that it may spread in the vertical direction to the application-of-pressure direction, while being greatly compressed in a moisture decrement and the application-of-pressure direction.

[0083] consequently, this absorptivity resin 30 -- a compression ratio -- two or more -- desirable -- 5-1000 -- more -- desirable -- 10-200 -- further -- desirable -- 15-100 It is compressed and fixed in the condition of having been distorted flatly so that it may become.

[0084] A compression ratio in this invention, it is expressed with the ratio of the expansion ratio of the drawing direction of absorptivity resin 30 to the shrinkage ratio of the compression direction of absorptivity resin 30. The above-mentioned compression ratio can be measured by the following approaches. Here, the primary particle of water gel shall be used as absorptivity resin 30.

[0085] First, it asks for the mean particle diameter of absorptivity resin 30. Subsequently, thickness D1 of the compression direction of the absorptivity resin 30 after application of pressure The average die length D2 of the drawing direction (diameter) For example, it measures per 0.01mm using slide calipers etc. And it is the thickness D1 of the compression direction of the absorptivity resin 30 after application of pressure at the mean particle diameter of the used absorptivity resin 30. It divides and asks for a shrinkage ratio X. Similarly, it is the average die length (diameter) D2 of the drawing direction of the absorptivity resin 30 after application of pressure at the mean particle diameter of the used absorptivity resin 30. It divides and asks for an expansion ratio Y. The above-mentioned actuation is measured about ten - 100 particles, and let it be the compression ratio of this invention with the average of Y/X.

[0086] if the above-mentioned compression ratio is less than two -- the absorptivity resin 30 after compression -- ** -- it is high, and since it becomes difficult to miniaturize the absorptivity article containing an absorptivity ingredient, as a result this absorptivity ingredient, it is not desirable. Moreover, with [the above-mentioned compression ratio] two [less than], the improvement effectiveness of sufficient rate of absorption is difficult to get from distortion of absorptivity resin 30 becoming small. Moreover, a compression ratio When exceeding 1,000, distortion of absorptivity resin 30 becomes large too much, the configuration is destroyed, and there is a possibility that it may become difficult to restore to the original configuration after water absorption and expansion.

[0087] Thus, the above-mentioned absorptivity resin 30 is being compressed and fixed in the condition of having been distorted flatly, by the ability of the structure of cross linkage to distort by application of pressure (compression) (immobilization). For this reason, if this absorptivity resin 30 has strain energy inside and contacts water, since this strain energy is released, the internal stress of magnitude which is different in the sense of each axis of coordinates (x y, z) so that distortion of the above-mentioned structure of cross linkage may be resisted will produce it. Consequently, as shown in drawing 2 (b), that it should restore to the condition before application of pressure (compression), this absorptivity resin 30 absorbs water quickly, and it swells it so that it may have an anisotropy with the above-mentioned internal stress (different direction swelling).

[0088] That is, the above-mentioned absorptivity resin 30 shifts to the compression condition shown in drawing 2 (a) by application of pressure from the gel initial state shown in drawing 2 (b), and water absorption and swelling restore it to the condition before the application of pressure again shown in drawing 2 (b). This absorptivity resin 30 has the same configuration an application-of-pressure front and after water absorption.

[0089] In addition, in U.S. Pat. No. 4,920,202, 5,075,344, and 5,145,906, the water gel of the hydrophilic cross linked polymer is dried, and the method of obtaining absorptivity resin powder by grinding as occasion demands further is indicated. However, only by drying water gel, in order to contract and dry to ******, it dries without having distortion and absorptivity resin serves as powder. Consequently, at the time of water absorption and swelling, it swells in an analog.

[0090] On the other hand, in this invention, in order to contract in the form where the water gel distorted by application of

pressure by decreasing moisture was distorted as it is, pressurizing, it fears the account of a configuration. In addition, to shape memory, it is indispensable that absorptivity resin 30 has the structure of cross linkage and that the condition before application of pressure is in the gel state, and shape memory is impossible in a polymer without the structure of cross linkage. [0091] Thus, the above-mentioned absorptivity resin 30 is having memorized the configuration before application of pressure, and the absorptivity ingredient of this invention containing the above-mentioned absorptivity resin 30 is excellent in especially various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure.

[0092] The water content of the above-mentioned absorptivity ingredient concerning this invention and the above-mentioned absorptivity ingredient has 80 or less desirable % of the weight, 5 % of the weight - 50% of the weight of its within the limits is more desirable, 5 % of the weight - 30% of the weight of especially its within the limits is desirable, and 6 % of the weight - 25% of the weight of its within the limits is the most desirable. Although adjusted by decreasing moisture, pressurizing for example, water gel, after application of pressure, separately, moisture may be added, or the water content of the above-mentioned absorptivity ingredient may dry, and may be adjusted if needed. Moreover, in this invention, the water gel constituent 10 can be continuously processed by rolling out the water gel constituent 10 using the drum dryer which put the compression equipment side by side, and making it the shape of a sheet. That is, an absorptivity ingredient can be manufactured continuously.

[0093] Thus, whenever [which the acquired sheet absorptivity ingredient of the above excelled / whenever / in flexibility, for example, was measured by the method whenever it was / gar rhe ** / flexible / flexible] is 100 or less mgves especially preferably 200 or less mgves still more preferably 500 or less mgves preferably 1,000 or less mgves. Thus, the absorptivity ingredient of the shape of a sheet concerning this invention can give the so-called feeling of software, and a good usage feeling to these hygienic goods (absorptivity article), when it excels in flexibility and this absorptivity ingredient is used for hygienic goods (absorptivity article), such as a diaper and a sanitary napkin. In addition, an example explains a measuring method whenever flexible.

[0094] The manufacture approach of the absorptivity ingredient concerning this invention is an approach of decreasing moisture as mentioned above while pressurizing water gel (rolling). As for the above-mentioned water gel, in this invention, it is desirable that polyhydric alcohol is included further.

[0095] According to the above-mentioned approach, the absorptivity ingredient with which this hydrophilic cross linked polymer was fixed can be manufactured, without once making the water gel of the hydrophilic cross linked polymer, i.e., the water gel of absorptivity resin, into the shape of powder. Therefore, since the various processes of drying, and grinding and sifting out become unnecessary, while dust is not generated, handling becomes easy and work environment is improved, a production process is simplified and productivity can be raised. Thereby, even if it does not use fixed base materials, such as a nonwoven fabric, the absorptivity ingredient of the shape of direct and a sheet can be manufactured cheaply and easily from cellular content gel. And according to the above-mentioned approach, the hydrophilic cross linked polymer, i.e., an absorptivity ingredient with more contents of absorptivity resin than before, can be manufactured.

[0096] Moreover, since the above-mentioned water gel or a water gel constituent is rolled out and it is made the shape of a sheet while being able to give flexibility and reinforcement to the absorptivity ingredient obtained according to the above-mentioned approach, this absorptivity ingredient can be rolled round on a roll etc., or tension can be applied. Thereby, an absorptivity ingredient can be manufactured continuously.

[0097] And even if the absorptivity ingredient of this invention is a plane sheet, the above-mentioned absorptivity resin, i.e., a hydrophilic cross-linked-polymer particle, can make it curl by making a low temperature range into the inside, by fearing the configuration before application of pressure the account of a configuration at the time of water absorption swelling, so that it may have curvature. For this reason, when this absorptivity ingredient is used for hygienic goods (absorptivity article), such as a diaper and a sanitary napkin, a shape can be fitted by swelling curling so that this absorptivity ingredient may draw a curve along with bodily radii of circle (radius of circle of the buttocks etc.) at the time of water absorption, and liquid leakage at bulb can be prevented.

[0098] Furthermore, if this absorptivity resin contacts water, since it will absorb water quickly including the absorptivity resin swollen so that it may have an anisotropy by water absorption that it should recover in the condition before compression, the absorptivity ingredient obtained by the above-mentioned approach is excellent in especially various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure. This absorptivity resin has the structure of cross linkage which was able to be distorted by compression, and when the force which it is going to recover in the condition before compression to this structure of cross linkage works, it shows water absorption stability.

[0099] Moreover, the water content of the above-mentioned absorptivity ingredient is 80 or less % of the weight, and contains polyhydric alcohol and a shaping auxiliary material further if needed. Moreover, the rate of absorption the absorptivity ingredient of the shape of a sheet acquired by the above-mentioned approach They are 30 g/g especially preferably more than 25 g/g more preferably more than 20 g/g preferably [are 150 or less seconds, and the absorption scale factor under application of pressure is more than 15 g/g, and]. It is above.

[0100] Thus, according to the above-mentioned configuration, the absorptivity ingredient which was excellent in various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, directly from water gel, and was excellent in flexibility or reinforcement can be obtained. And when an absorptivity ingredient contains polyhydric alcohol, while the cushioning properties of this absorptivity ingredient become much more good, configuration mnemonic can improve and various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, can be raised further. Furthermore, when an absorptivity ingredient contains a shaping

auxiliary material, while the firmness of this absorptivity ingredient becomes much more good, flexibility and reinforcement can be raised further.

[0101] Moreover, for above-mentioned absorptivity resin itself, since the above-mentioned absorptivity ingredient is a configuration which it comes to carry out a ** type, it can make [many] it as compared with the conventional absorptivity ingredient which pinches thru/or supports and becomes base materials, such as pulp and a nonwoven fabric, about absorptivity resin, the amount of hydrophilic cross linked polymer of absorptivity resin, i.e., amount, per unit area. For this reason, rate of absorption and the absorption scale factor under application of pressure can be raised conventionally. That is, the absorptivity ingredient obtained by the manufacture approach of this invention can absorb this aquosity liquid promptly, when aquosity liquids, such as water, and body fluid, a drip, are contacted.

[0102] In addition, in the above-mentioned explanation, although the case where the absorptivity ingredient was formed in the shape of a sheet was mentioned as the example, the configuration of this absorptivity ingredient may have the shape of for example, the letter of a block, tabular, and a film etc., and even if it grinds and is powdered, it is good, and is not limited especially.

[0103] Moreover, absorptivity ingredient of the shape of a sheet of this invention (I) 0.01mm - 5mm, preferably, the thickness of - (II) and a (sheet) is 0.5mm - 1mm, and can be easily adjusted by adjusting said compression ratio still more preferably 0.1mm - 3mm. And the above-mentioned compression ratio can be easily adjusted by adjusting the path clearance between time amount, temperature, a compression equipment, and a drum dryer etc.

[0104] Furthermore, after pressurizing the water gel of the hydrophilic cross linked polymer, the above-mentioned absorptivity ingredient may be formed in the shape of a sheet by sheet-izing, once it makes it the shape of powder. However, it is desirable to form a direct sheet, without the above-mentioned water gel once making the above-mentioned water gel the shape of powder from fields, such as handling nature, and work environment, productivity, including polyhydric alcohol.

[0105] Moreover, in the above-mentioned explanation, although the configuration with which it comes to mix the mixture of for example, water gel and polyhydric alcohol and the fiber as a shaping auxiliary material was mentioned as the example as an absorptivity ingredient, especially the configuration of this absorptivity ingredient is not limited. As a configuration of an absorptivity ingredient, besides a configuration of having mixed mixture and fiber, like textile fabrics, a nonwoven fabric, and paper The configuration which pinched mixture among two or more fiber formed in the shape of a sheet; After mixing mixture and fiber and forming in the shape of a sheet, The configuration which pinched the fiber formed in the shape of a sheet as these two or more sheets are also; after mixing mixture and fiber and forming in the shape of a sheet, configuration; which pinched this sheet as two or more fiber formed in the shape of a sheet is also is mentioned.

[0106] The absorptivity article concerning this invention has come to contain the absorptivity ingredient of the above-mentioned configuration. That is, an absorptivity ingredient is itself or let it be an absorptivity article by combining with other raw materials. Although it is not limited, when offering an absorptivity article as hygienic goods, such as for example, a paper diaper, and a sanitary napkin, an incontinentia pad, the configuration which comes to pinch the configuration which it comes to pinch with the sheet which has liquid permeability for the absorptivity ingredient of the shape of a sheet of the above-mentioned configuration, and the sheet which has non-liquid permeability, or a sheet-like absorptivity ingredient with the sheet of two sheets which has liquid permeability is suitable for especially the configuration of this absorptivity article. While being able to prevent the leakage of urine when an absorptivity article is a paper diaper, for example since the absorptivity ingredient as an absorption layer is equipped with the outstanding absorption property, the so-called dry feeling can be given.

[0107] The sheet (a liquid permeability sheet is called hereafter) which has the above-mentioned liquid permeability consists of an ingredient equipped with the property which penetrates an aquosity liquid. Webs, such as textile fabrics which consist of synthetic fibers, such as nonwoven fabrics, such as a regenerated-cellulose system nonwoven fabric, and rayon, as an ingredient of a liquid permeability sheet, for example, and a cotton card web, or mat; curdy pulp, paper; the synthetic-resin film of the porosity which consists of polyethylene, polypropylene, polyester, a polyamide, etc. is mentioned. In addition, the liquid permeability sheet may be formed in the shape of [which has the magnitude which is extent which can hold an absorptivity ingredient] a bag body.

[0108] The sheet (a liquid impermeable sheet is called hereafter) which has the above-mentioned non-liquid permeability consists of an ingredient equipped with the property which does not penetrate an aquosity liquid. The film which consists of composite of the synthetic-resin film; these synthetic resin and the nonwoven fabric which consist of a ~~polyamide~~, polyethylene, polypropylene, polystyrene, a polyvinyl chloride, etc. as an ingredient of a liquid impermeable sheet, for example; the film which consists of composite of the above-mentioned synthetic resin and textile fabrics is mentioned. In addition, the liquid impermeable sheet may be equipped with the property which penetrates a steam.

[0109] Especially the manufacture approach of an absorptivity article is not limited and should just pile up the liquid impermeable sheet, above-mentioned absorptivity ingredient, and above-mentioned liquid permeability sheet of each other. Moreover, if needed, attachment immobilization of the piled-up sheet may be carried out in the periphery section, attachment immobilization may be carried out selectively, a slit may be put in, or processing processing of embossing etc. may be performed. In addition, an absorptivity article can also be formed by laying a liquid impermeable sheet or a liquid permeability sheet on top of one side of a sheet-like absorptivity ingredient. Furthermore, for example, after laying water gel or a water gel constituent on a liquid impermeable sheet or a liquid permeability sheet (spreading), an absorptivity ingredient, i.e., an absorptivity article, can also be manufactured by pressurizing this water gel or a water gel constituent (rolling). Moreover, after cutting a sheet-like absorptivity ingredient in the shape of a strip of paper etc., an absorptivity article may be formed by mixing with cellulose fiber etc.

[0110] Next, it explains briefly [below] about the paper diaper as an example of the absorptivity article concerning this

invention, referring to drawing 3. In addition, an absorptivity article is not limited only to a paper diaper.

[0111] The paper diaper consists of a backseat 21 which is a liquid impermeable sheet, a sheet absorptivity ingredient 22 of the above, and top sheet 23 grade which is a liquid permeability sheet, as shown in drawing 3. The top sheet 23 is formed in the backseat 21 list at the predetermined configuration. And the backseat 21, above-mentioned absorptivity ingredient 22, and above-mentioned top sheet 23 of each other are stuck on this order through the double-sided tape etc. Moreover, the so-called leg gathers 24-24 and the so-called waist gathers 25-25 are formed in the predetermined location in this attachment object. Furthermore, the so-called tape fastener 26-26 is attached in the predetermined location in the above-mentioned attachment object. Thereby, the paper diaper as an absorptivity article is created.

[0112] Since the above-mentioned paper diaper comes to use the absorptivity ingredient which is excellent in various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, and is excellent in flexibility or reinforcement, when urine is contacted, it can absorb this urine promptly. That is, a busy condition can offer a good paper diaper, without the leakage of urine etc. arising.

[0113] And since the above-mentioned paper diaper is swollen while the absorptivity ingredient 22 curls at the time of water absorption swelling, it can fit a shape and can prevent liquid leakage at bulb further.

[0114] As mentioned above, while being able to offer the absorptivity article which is excellent in various absorption properties, such as rate of absorption and an absorption scale factor under application of pressure, by an absorptivity article coming to contain the above-mentioned absorptivity ingredient, the so-called feeling of software and a good usage feeling can be given to the absorptivity article obtained. Therefore, the absorptivity article excellent in the touch can be offered. Moreover, the rate of the hydrophilic cross linked polymer to the AUW of an absorptivity article can make more preferably the rate of less than 40 % of the weight and the hydrophilic cross linked polymer [as opposed to / according to / although it was low concentration comparatively / the above-mentioned configuration / the AUW of an absorptivity article] conventionally about 60 % of the weight - 80% of the weight of high concentration still more preferably about 50 % of the weight to 80% of the weight about 40 % of the weight to 80% of the weight. Therefore, thin shape-ization and miniaturizing can do an absorptivity article, with the conventional absorptivity article and the absorption property more than equivalent maintained. Moreover, since the absorptivity ingredient is formed by pressurizing water gel, in various processes, such as a production process of an absorptivity ingredient and an absorptivity article, a packaging process, and a transport process, there is nothing that the hydrophilic cross linked polymer does not move into an absorptivity ingredient, and is also dropped out of an absorptivity ingredient (it falls). Furthermore, when the above-mentioned absorptivity ingredient is fabricated for example, in the shape of a sheet, once it makes absorptivity resin into the shape of powder, as for the absorptivity ingredient of this invention, unlike the conventional absorptivity ingredient which formed in the shape of a sheet and was obtained, after water absorption and swelling is maintained in the shape of a sheet. For this reason, even if it is after water absorption and swelling, there is nothing that a diaper etc. to gel drops out of this absorptivity ingredient (it falls).

[0115] In addition, a deodorant, perfume, various drugs, various kinds of inorganic powder, a water soluble polymer, a vegetable training assistant, a germicide, an antifungal agent, a foaming agent, a pigment, a color, carbon black, activated carbon, a hydrophilic staple fiber, fertilizer, an oxidizer, a reducing agent, water, salts, etc. can be further added into the above-mentioned absorptivity ingredient, and, thereby, various functions can also be further given to it at an absorptivity ingredient or an absorptivity article.

[0116] An above-mentioned absorptivity ingredient and an above-mentioned absorptivity article are used suitable for various applications, such as medical ingredients, such as hygienic goods, such as an application, for example, a paper diaper (disposable diaper) and a sanitary napkin, aiming at absorption, moisture absorption, etc. of an aquosity liquid, a tampon, and the so-called incontinentia pad, a dew condensation water absorption sheet, water retention material for plantation arts, water cutoff material for engineering works, a medical sheet, and a bed pad, food-grade freshness maintenance material, a food-grade drip absorber, a towel, and dressings. In addition, especially the application of an absorptivity ingredient or an absorptivity article is not limited.

[0117]

[Example] Hereafter, although an example and the example of a comparison explain this invention to a detail further, this invention is not limited at all by these. In addition, many engine performance of an absorptivity ingredient was measured by the following approaches.

[0118] (a) Cut the absorptivity ingredient of the shape of water content point ** and a sheet in 10cmx10cm magnitude, and it is the weight W0 of this absorptivity ingredient (a cutting sheet is called hereafter). (g) was measured. Next, the above-mentioned cutting sheet was put into the oven (the Tokyo science appliance incorporated company make: type NDO-450) by which temperature control was carried out to 180 degree C, and was left for 3 hours. Subsequently, after having taken out the cutting sheet, laying in the desiccator with which silica gel is in close and cooling radiationally for 5 minutes, the weight W1 (g) was measured. these weight W0 and W1 from -- according to a degree type and water content (% of the weight) = [(weight W0(g)-weight W1 (g)) / weight W0 (g)] x100, water content (% of the weight) was computed. [and]

[0119] (b) Absorption scale-factor absorptivity ingredient It was immersed into [after putting 0.2g into the tea bag type bag made of a nonwoven fabric (60mmx60mm) and heat sealing opening] the 0.9-% of the weight sodium chloride water solution (physiological saline). A tea bag type bag is pulled up after 30 minutes, and a centrifugal separator is used. Weight W2 of a tea bag type bag after performing a ridge for 3 minutes by 250G (g) was measured. Moreover, same actuation is performed without using an absorptivity ingredient, and it is weight W3 at that time. (g) was measured. and these weight W2 and W3 from -- a degree type and absorption scale factor the weight (g) of (g/g)= (weight W2(g)-weight W3 (g)) / absorptivity ingredient -- following -- absorption scale factor (g/g) It computed.

[0120] (c) Absorption scale-factor point ** under application of pressure, bore It is a diameter in 160mm and a glass petri dish with a height of 20mm. On this petri dish after laying a 120mm glass filter plate (G#1) Brine was poured out 0.4% of the weight. This brine was made into an amount the water surface of this brine and whose top face of the above-mentioned filter plate correspond mostly. Next, the filter paper (Toyo Roshi [Kaisha, Ltd.] make: TOYO FILTER PAPER No.2) was laid on the filter plate.

[0121] And when an absorptivity ingredient is a sheet-like, it is the absorptivity ingredient of the shape of this sheet. It cuts in the magnitude of 3.1cmx 3.1cm, and is the weight W4 of this absorptivity ingredient (a cutting sheet is called hereafter). (g) was measured. Moreover, the support cylinder was created by fixing the wire gauze made from stainless steel of 400 meshes to the pars basilaris ossis occipitalis of the cylinder made of acrylic resin with a bore [of 55mm], and a height of 60mm. Next, the measurement cylinder was created by laying the above-mentioned cutting sheet in a support cylinder (i.e., a wire gauze top), and laying the plunger made from brass of the shape of a cylinder as weight on this cutting sheet further. The weight is adjusted so that a plunger can add the load of 50 g/cm² to homogeneity to a cutting sheet. (And the above-mentioned cutting sheet, a support cylinder, and the weight W5 of the sum total of a plunger, i.e., weight of a measurement cylinder, (g) was measured.)

[0122] Subsequently, this measurement cylinder was laid on the above-mentioned filter paper. And the cutting sheet in a measurement cylinder was made to absorb the above-mentioned brine over 30 minutes from the event of laying a measurement cylinder on a filter paper. On that is, a cutting sheet 0.4-% of the weight brine was made to absorb under application of pressure, moreover, the water surface of the above-mentioned brine and the top face of a filter plate are mostly in agreement so that the amount of the above-mentioned brine may serve as about 1 law in the meantime -- as -- petri dish 0.4-% of the weight brine -- suitably -- pouring -- a guide peg -- the bottom. Weight W6 of after the progress during 30 minutes, and a measurement cylinder (g) was measured. these weight W4, W5, and W6 from -- a degree type and absorption scale factor under application of pressure (g/g)=(weight W6(g)-weight W₅(g)) / weight W4 (g) -- following -- absorption scale factor under application of pressure (g/g) It computed. [and]

[0123] On the other hand, when an absorptivity ingredient was powdered, it replaced with the sheet of 3.1cmx 3.1cm, the absorptivity ingredient of 0.9 g was sprinkled to homogeneity inside said cylinder made of acrylic resin, and the absorption scale factor under the load of 50 g/cm² was measured similarly hereafter. And a top type is followed and it is an absorption scale factor under application of pressure. (g/g) It computed.

[0124] (d) When a rate-of-absorption absorptivity ingredient was a sheet-like, first, the sheet-like absorptivity ingredient was cut in 2.54cmx2.54cm (1 square inch) magnitude, and the weight of this absorptivity ingredient (a cutting sheet is called hereafter) was measured. On the other hand, the container made from polypropylene with a bore [of 55mm] and a height of 15mm was filled with the physiological saline of weight 10 times to the weight of a cutting sheet. Subsequently, the cutting sheet was thrown in in this physiological saline. And from the event of throwing in a cutting sheet in a physiological saline, time amount until a physiological saline is altogether absorbed by the cutting sheet was measured, and this time amount was made into rate of absorption (second). It judged whether the physiological saline was altogether absorbed by the cutting sheet by whether the container made from polypropylene is leaned to 45 degrees, and the liquid reservoir of this physiological saline is generated. That is, the event of a liquid reservoir not being generated was considered as the event of a physiological saline being altogether absorbed by the cutting sheet.

[0125] Moreover, when an absorptivity ingredient was powdered, it replaced with the 2.54cmx2.54cm sheet, and rate of absorption was hereafter measured similarly using the 1g absorptivity ingredient.

[0126] (e) Flexibility flexibility was measured only about the sheet-like absorptivity ingredient, and the method was followed whenever the measuring method was [gar rhe ** / which was specified to JISL 1096] flexible. In addition, flexibility shows that flexibility is so high that the value (whenever [flexible]) measured by this approach is small.

[0127] [Example 1] The diameter of a revolution The double arm mold kneader made from stainless steel with a jacket of content volume 10L who has two sigma mold wings which are 120mm was used as the reactor. This kneader has the lid which seals the inside of a system, and the application-of-pressure lid which can apply the pressure of 66kg to contents. To the above-mentioned reactor, they are an acrylic acid as a monomer component, and the 38-% of the weight water solution of acrylic-acid sodium (75 mol % of neutralization indices). After teaching 5,000g and trimethylolpropane triacrylate 2.85g as a cross linking agent and considering as reaction mixture, nitrogen gas was blown and nitrogen inert gas replacement of the system was carried out. They are the amount of the trimethylolpropane triacrylate used to a monomer component, and 0.045-mol %.

[0128] Next, 30-degree C warm water was stirred in the jacket, warming through and reaction mixture. Then, when the sodium persulfate and L-ascorbic acid as a polymerization initiator were added to reaction mixture, stirring, the polymerization began after about 1 minute. The amount of the sodium persulfate used to a monomer component is 0.12-mol %, and is the amount of the L-ascorbic acid used, and 0.005-mol %.

[0129] And after performing a polymerization for 60 minutes at 30 degrees C, the application-of-pressure lid was put on the obtained massive water gel (contents), it stirred for 20 minutes, and this water gel was subdivided. Thereby, particle diameter The water gel subdivided by 0.2mm - 0.8 mm was obtained. The solid content of this water gel was 38 % of the weight.

[0130] Subsequently, the subdivided above-mentioned water gel 800g was taught to the above-mentioned kneader and the kneader who has the same configuration. Moreover, mixed liquor (glycerol 33.8g as polyhydric alcohol and ethylene-glycol-diglycidyl-ether (Nagase Brothers formation industrial incorporated company make; trade name DENAKORU EX- 810) 0.31g as a surface cross linking agent) was prepared. Next, 70-degree C warm water was stirred in the jacket, warming through and water gel. Then, stirring, it stirred until it added the above-mentioned mixed liquor to this water gel and both were mixed at homogeneity. Solid content of water gel The amount of the glycerol used to the 100 weight sections is the 11.1 weight

sections, and is the amount of the ethylene glycol diglycidyl ether used, and the 0.1 weight sections.

[0131] Next, 10.4g (shaping auxiliary material) of polyester fiber with a die length of 2mm - 3mm which becomes the obtained mixture from polyethylene terephthalate was added little by little, and it kneaded until the lump of this fiber was lost. Solid content of water gel They are the addition of the polyester fiber to the 100 weight sections, and the 3.4 weight sections. This obtained the water gel constituent.

[0132] Then, while rolling out the above-mentioned water gel constituent using the compression equipment put side by side in an open-end single drum dryer (type by KATSURAGI Industries, and NRXM750-N35C), and a list, it is the above-mentioned water gel constituent (I) by the dryer drum. The contact surface with the dryer drum which can be set It heated at 150 degrees C. Then, the obtained sheet was scratched using the scraper from the dryer drum front face. Thereby, it is the thickness of 0.8mm. The sheet-like absorptivity ingredient was obtained. The main manufacture conditions of a water gel constituent were indicated to a table 1.

[0133] Basis weight of the obtained absorptivity ingredient 490 g/m² and water content The absorption scale factor was [25.2 g/g and the rate of absorption of the absorption scale factor under 30.2 g/g and application of pressure] 68 seconds 7.5% of the weight. These measurement result was indicated according to a table 2.

[0134] [Example 1 of a comparison] It is only with a drum dryer, without using a compression equipment for the obtained water gel constituent in an example 1. It sheet-sized, without heating and rolling out at 150 degrees C. Then, the obtained sheet was scratched using the scraper from the dryer drum front face. This obtained the sheet-like absorptivity ingredient. The measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0135] [Example 2 of a comparison] The water gel constituent was rolled out in the example 1, without heating a dryer drum. This sheet-sized the water gel constituent, without decreasing the moisture of water gel. Then, the obtained sheet was scratched using the scraper from the dryer drum front face (temperature of 25 degrees C). This obtained the sheet-like absorptivity ingredient. The measurement result of the obtained absorptivity ingredient was indicated according to a table 2. In addition, the shape retaining property of the obtained absorptivity ingredient was low, and measurement whenever flexible was impossible.

[0136] [Example 3 of a comparison] It is temperature about the absorptivity ingredient of the shape of a sheet acquired in the example 2 of a comparison. It put into the hot blast circulation type dryer kept at 105 degrees C, and it was dried. That is, the moisture was decreased after rolling out water gel. The measurement result of this absorptivity ingredient was indicated according to a table 2.

[0137] [Example 2] It replaced with the mixed liquor in an example 1, and except having used glycerol 76g, the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. Solid content of water gel The amount of the glycerol used to the 100 weight sections is 25 weight sections. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0138] [Example 3] It replaced with the mixed liquor in an example 1, and except having used mixed liquor (glycerol 76g and ethylene-glycol-diglycidyl-ether 0.31g), the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0139] [Example 4] It replaced with the mixed liquor in an example 1, and except having used mixed liquor (glycerol 76g and ethylene-glycol-diglycidyl-ether 1.53g), the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. Solid content of water gel They are the amount of the ethylene glycol diglycidyl ether used to the 100 weight sections, and the 0.5 weight sections. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0140] [Example 5] While replacing with the mixed liquor in an example 1 and using mixed liquor (glycerol 76g and ethylene-glycol-diglycidyl-ether 1.53g), except having changed the addition of polyester fiber into 16.0g from 10.4g, the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. Solid content of water gel They are the addition of the polyester fiber to the 100 weight sections, and the 5.3 weight sections. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0141] [Example 6] It replaces with the mixed liquor in an example 1, and is a glycerol. Except having used 304g, the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. Solid content of water gel They are the amount of the glycerol used to the 100 weight sections, and the 100 weight sections. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0142] [Example 7] While changing the charge of the trimethylolpropane triacrylate in an example 1 into 1.27g from 2.85g, it replaced with the mixed liquor in an example 1, and except having used mixed liquor (glycerol 76g and ethylene-glycol-diglycidyl-ether 1.53g), the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. The amount of the trimethylolpropane triacrylate used to a monomer component is 0.02-mol %. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0143] [Example 8] It replaces with the 38-% of the weight water solution of the acrylic-acid sodium in an example 7, and they are an acrylic acid as a monomer component, and the 30-% of the weight water solution of acrylic-acid sodium (75 mol % of neutralization indices). While using 5,000g, it replaced with trimethylolpropane triacrylate, and except having used

polyethylene-glycol diacrylate (eight average addition mols of ethylene glycol) 7.18g as a cross linking agent, the same reaction, actuation, etc. as an example 7 were performed, and the sheet-like absorptivity ingredient was obtained. The amount of the polyethylene-glycol diacrylate used to a monomer component is 0.07-mol %. Moreover, the solid content of water gel was 30 % of the weight. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0144] [Example 9] While replacing with the mixed liquor in an example 1 and using mixed liquor (glycerol 76g and ethylene-glycol-diglycidyl-ether 0.31g), except not using polyester fiber (it not adding), the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0145] [Example 10] While replacing with the mixed liquor in an example 1 and using mixed liquor (glycerol 76g and ethylene-glycol-diglycidyl-ether 1.53g), it replaced with polyester fiber, and except having used 76g (shaping auxiliary material) of pulp fiber with a fiber length of about 10mm - 20mm, the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. Solid content of water gel The addition of the pulp fiber to the 100 weight sections is 25 weight sections. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0146] [Example 11] In the example 1, except having changed the fiber length of polyester fiber into about 20mm - 30mm, the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. ***** and rate of absorption at the time of desiccation of this absorptivity ingredient and swelling were further superior to the absorptivity ingredient obtained in the example 1. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0147]

[A table 1]

		固体分 (重量%)	トリメチロールプロパン トリアクリレート (モル%)	グリセリン (重量部)	エチレングリコールジグリシジルエーテル (重量部)	ポリエステル繊維 (重量部)	(mm)
実 施 例	1	3.8	0.045	1.1.1	0.1	3.4	2~3
	2	3.8	0.045	2.5	0	3.4	2~3
	3	3.8	0.045	2.5	0.1	3.4	2~3
	4	3.8	0.045	2.5	0.5	3.4	2~3
	5	3.8	0.045	2.5	0.5	5.3	2~3
	6	3.8	0.045	1.00	0	3.4	2~3
	7	3.8	0.02	2.5	0.5	3.4	2~3
	8	3.0	(ポリエチレングリコールジ アクリレート) 0.07	2.5	0.5	3.4	2~3
	9	3.8	0.045	2.5	0.1	0	2~3
	10	3.8	0.045	2.5	0.5	(パルプ繊維) 2.5	1.0 ~2.0
	11	3.8	0.045	1.1.1	0.1	3.4	2.0 ~3.0

[0148]

[A table 2]

	坪量 (g/m ²)	含水率 (重量%)	吸収倍率 (g/g)	加圧下の吸収倍率 (g/g)	吸収速度 (秒)	柔軟度 (mgf)
実施例 1	49.0	7.5	30.2	25.2	6.8	750
比較例 1	51.0	8.2	29.8	24.4	9.2	930
比較例 2	99.0	54.1	15.5	9.8	27.0	—
比較例 3	52.0	9.9	28.8	23.4	9.7	1020
実施例 2	75.3	11.2	32.1	15.3	11.4	520
実施例 3	47.4	16.2	24.2	25.1	7.1	260
実施例 4	50.9	17.4	20.5	27.5	4.7	160
実施例 5	27.8	12.9	22.2	27.5	2.3	490
実施例 6	110.8	17.8	21.6	17.8	8.3	310
実施例 7	47.0	14.2	21.5	27.7	3.1	300
実施例 8	51.0	20.0	18.1	26.7	3.6	150
実施例 9	65.0	12.5	25.7	27.0	9.2	500
実施例 10	105.6	6.6	18.2	22.9	5.5	1000
実施例 11	49.0	7.4	30.5	25.1	6.0	840

[0149] It turns out that the absorptivity ingredient which was further excellent in decreasing the moisture, pressurizing water gel from the result given in a table 2 with absorption properties, such as an absorption scale factor under application of pressure and rate of absorption, as compared with the case where heating or either of the application of pressure or heating, and application of pressure are performed independently even if it used the same water gel constituent can be obtained. Furthermore, according to this example, it turns out that the absorptivity ingredient of the shape of a sheet excellent in the absorption scale factor and rate of absorption under application of pressure, especially flexibility, etc. can be obtained.

[0150] moreover, the compression ratio of the absorptivity ingredient shown in the above-mentioned examples 1-11 when the compression ratio was measured about the absorptivity ingredient of the shape of a sheet shown in examples 1-11 -- 10-100 it is -- it turns out that the outstanding physical properties, such as high rate of absorption, are shown [the absorptivity ingredient of the examples 1-3 of a comparison which are the absorptivity ingredients of a compression ratio 1]. In addition, it can ask for the above-mentioned compression ratio similarly by the approach described above also about the absorptivity ingredient of the shape not only of the primary particle of water gel but a sheet. Moreover, each absorptivity resin in each above-mentioned absorptivity ingredient was that from which water absorption and swelling recover in the condition before compression (rolling), and good water absorption stability is acquired.

[0151] [Example 12] The same reaction, actuation, etc. as an example 1 were performed first, and water gel was obtained. Next, the same actuation as an example 1 etc. was performed, and it rolled out and heated without mixing a glycerol (polyhydric alcohol), ethylene glycol diglycidyl ether (surface cross linking agent), and polyester fiber (shaping auxiliary material) to this water gel. That is, rolling and heating of were done, using only water gel as a water gel constituent.

[0152] Then, obtained absorptivity ingredient 200g was broken, and it supplied to the mixer, it ground for 15 seconds, and it was presupposed that it is powdered. Next, it is an opening about the absorptivity ingredient of the shape of this powder. By classifying by the 500-micrometer JIS standard sieve, coarse grain was removed and the absorptivity ingredient of the shape of powder concerning this invention was obtained.

[0153] The above-mentioned absorptivity ingredient obtained by rolling out and heating the above-mentioned water gel was dramatically weak, and was not able to form a direct sheet-like absorptivity ingredient from a water gel constituent. That is, when [0027] And if the various absorption properties with which the absorptivity ingredient concerning this invention should be equipped to be obtained. However, the absorption scale factor of the absorptivity ingredient of the shape of powder acquired by drying the above-mentioned absorptivity ingredient and classifying was able to obtain the absorptivity ingredient with which 11.3 g/g and rate of absorption are 25 seconds, and the absorption scale factor under 42.5 g/g and application of pressure excelled [rate of absorption] especially in these absorption property. The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0154] [Example 4 of a comparison] It sets in the example 12 and is water gel. Dry matter which dried by 160-degree C hot blast for 1 hour, and was obtained Opening after a desk grinder grinds 200g By classifying by the 500-micrometer JIS standard sieve, coarse grain was removed and the powder-like absorptivity ingredient was obtained. The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0155] [Example 5 of a comparison] In the example 4 of a comparison, hot press of the mixture of the powder-like absorptivity ingredient and polyhydric alcohol which were obtained was carried out to U.S. Pat. No. 4,066,583 based on the approach of a publication. That is, glycerol 2g as powder-like 8g of absorptivity ingredients and polyhydric alcohol obtained in the example 5 of a comparison was first taught to the predetermined container, and powdered mixture was obtained by mixing to homogeneity quickly. After opening this mixture in 10cmx10cm magnitude on a smooth plate at homogeneity, the above-mentioned mixture was reformed by putting into the air-conditioned room beforehand adjusted to the temperature of 25 degrees C, and 90% of relative humidity, and leaving it for 10 minutes. The mixture after humidification is the shape of a sheet which the powder absorptivity ingredient of the above condensed, and it had the firmness which is extent which can be raised slowly.

[0156] Next, the application-of-pressure machine of a heating mold is used for the sheet mixture of the above, and it is temperature. It pressurized for 5 minutes on condition that 150 degrees C and pressure 350 gf/cm². This obtained the transparent sheet-like moldings with a thickness of about 1mm. Subsequently, the sheet-like absorptivity ingredient was obtained by adding water to this sheet-like moldings, so that it may become 17.0 % of the weight of water content. The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0157] [Example 13] The same reaction, actuation, etc. as an example 1 were performed first, and water gel was obtained. Next, after mixing only ethylene-glycol-diglycidyl-ether 0.31g to this water gel, the same actuation as an example 1 etc. was performed, and it rolled out and heated. That is, rolling and heating of were done, using the mixture of water gel and ethylene glycol diglycidyl ether as a water gel constituent. Then, obtained absorptivity ingredient The same grinding as an example 12 and a classification were performed using 200g, and the powder-like absorptivity ingredient was obtained.

[0158] In this example, the above-mentioned absorptivity ingredient obtained by rolling out and heating a water gel constituent was dramatically weak, and was not able to form a direct sheet-like absorptivity ingredient from a water gel constituent. That is, since water gel was rolled out and heated under the nonexistence of polyhydric alcohol, a sheet-like absorptivity ingredient was not able to be obtained. However, absorption properties, such as rate of absorption and an absorption scale factor under application of pressure, and the absorptivity ingredient which was excellent in rate of absorption also especially in it were able to be obtained by heating the above-mentioned water gel constituent to rolling and coincidence. The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0159] [Example 6 of a comparison] Dry matter which dried by the hot blast of 160 degree C for 1 hour, and was obtained instead of setting in the example 13, and rolling out and heating a water gel constituent Opening after a desk grinder grinds 200g By classifying by the 500-micrometer JIS standard sieve, coarse grain was removed and the powder-like absorptivity ingredient was obtained. The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0160] [Example 7 of a comparison] Glycerol 2g was mixed into 8g of absorptivity ingredients of the shape of powder acquired in the example 6 of a comparison, the same actuation as the example 5 of a comparison was performed hereafter, and the transparent sheet-like moldings with a thickness of about 1mm was obtained. Subsequently, the sheet-like absorptivity ingredient was obtained by adding water to this sheet-like moldings, so that it may become 19.2 % of the weight of water content. The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0161] [an example 14] -- the reaction vessel of 20L which attached an agitator, a reflux cooler, a thermometer, nitrogen gas installation tubing, and a dropping funnel first -- the cyclohexane 10 as an aquosity solvent -- L and HLB (hydrophile-lypophile balance) 40g (Dai-Ichi Kogyo Seiyaku Co., Ltd. make; trade name DK-ester F-50) of sucrose fatty acid ester as a surfactant of 6 was taught and stirred. And after dissolving sucrose fatty acid ester in the above-mentioned cyclohexane, nitrogen gas was blown and nitrogen inert gas replacement of the reaction vessel was carried out.

[0162] On the other hand, they are an acrylic acid as a monomer component, and the 35-% of the weight water solution of acrylic-acid sodium (75 mol % of neutralization indices). To 3,030g, it is hydroxyethyl cellulose (die cel combination incorporated company make; trade name EP-850) as N [as a cross linking agent], and N'-methylenebis acrylamide 0.16g, and a thickener. 5.3 g was dissolved and the monomer water solution was prepared. Subsequently, potassium persulfate as a polymerization initiator after blowing nitrogen gas into the above-mentioned monomer water solution and driving out dissolved oxygen 1.6g was added and it was made to dissolve.

[0163] Then, the above-mentioned monomer water solution in which the polymerization initiator was dissolved was added in the solution in the above-mentioned reaction vessel, it considered as reaction mixture, this reaction mixture was stirred at 60 degrees C for 2 hours, and the opposite phase suspension polymerization was performed. Consequently, the globular form gel polymer was obtained. Subsequently, azeotropy dehydration of the obtained gel polymer is carried out in a reaction vessel, and it is mean particle diameter. The 480-micrometer spherical polymer dehydrate was obtained. Then, it is the particle size of this polymer dehydrate by classifying the above-mentioned polymer dehydrate by the JIS standard sieve. Step was kept with 500 micrometers - 600 micrometer.

[0164] Then, the above-mentioned polymer dehydrate after classification The cross linking agent water solution which becomes the 100 weight sections from the ethylene-glycol-diglycidyl-ether 0.05 section as a cross linking agent, the water 3 section, and the isopropanol 2 section was added, surface bridge formation was performed by 200 **, and the secondary cross linked polymer was obtained. since the above-mentioned secondary cross linked polymer decreased the moisture, without pressurizing the above-mentioned gel polymer -- mean particle diameter 480 micrometers -- true -- it was spherical.

[0165] Then, the water gel of 35 % of the weight of solid content was obtained by making the above-mentioned secondary cross linked polymer add and swell water. Water gel of the following **** and this secondary cross linked polymer was performed for the same actuation as an example 1 etc., and the powder-like absorptivity ingredient was obtained rolling and by heating.

[0166] The thickness of the average which measured each particle in this absorptivity ingredient, i.e., the secondary

cross-linked-polymer particle after rolling / heating, (absorptivity resin), and 100 secondary cross-linked-polymer particles was the discoid whose average diameter is similarly 2.60mm 0.07mm. therefore, the shrinkage ratio X of the compression direction (the thickness direction) of the secondary cross-linked-polymer particle after above-mentioned rolling / heating -- the expansion ratio Y of 0.07/0.48 and the drawing direction -- 2.60/0.48 it is -- compression ratio Y/X specified by this invention is set to 37. That is, the secondary cross-linked-polymer particle in the above-mentioned absorptivity ingredient is compressed 37 times as compared with rolling / heating before. For this reason, the absorptivity ingredient which consists of the above-mentioned secondary cross-linked-polymer particle is high rate of absorption (48 seconds) by the strain energy which is inherent in this secondary cross-linked-polymer particle. It was shown, swelled the different direction at the time of water absorption, and recovered in the configuration before rolling / heating (spherical). The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0167] [Example 8 of a comparison] The same reaction, actuation, etc. as the above-mentioned example 14 were performed, and the secondary cross linked polymer was obtained. Many engine performance was measured for this secondary cross linked polymer as an absorptivity ingredient for a comparison as they were. That is, this absorptivity ingredient is not compressed but the compression ratio is 1. The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0168]

[A table 3]

	坪量 (g/m ²)	含水率 (重量%)	吸収倍率 (g/g)	加圧下の吸収倍率 (g/g)	吸収速度 (秒)	柔軟度 (m g f)
実施例 1 2	粉末	6. 5	4.2. 5	1.1. 3	2.5	—
比較例 4	粉末	6. 4	4.2. 0	1.0. 0	3.5	—
比較例 5	9.2.8	17. 0	3.1. 5	4. 5	6.8.0	4.1.0
実施例 1 3	粉末	5. 1	3.4. 6	2.8. 4	2.1	—
比較例 6	粉末	5. 2	3.4. 0	2.7. 8	3.2	—
比較例 7	9.6.3	19. 2	2.2. 4	9. 8	5.8.0	3.8.0
実施例 1 4	粉末	5. 1	4.5. 3	2.7. 4	2.5	—
比較例 8	粉末	0. 5 >	4.4. 4	2.7. 0	4.8	—

[0169] Even if it uses the same water gel constituent by decreasing the moisture from a result given in a table 3, pressurizing water gel, as compared with the case only heated, without pressurizing, it turns out that the absorptivity ingredient of the shape of powder which was further excellent with the absorption scale factor and rate of absorption under application of pressure can be obtained. Moreover, by the conventional approach, once it makes it powder, the rate of absorption and absorption scale factor under application of pressure fall substantially by sheet-izing, and it turns out that the absorptivity ingredient of the shape of a sheet excellent in these absorption property cannot be obtained.

[0170] Moreover, distortion of the structure of cross linkage which this absorptivity resin has shows that rate of absorption becomes quick by the absorptivity resin with which the obtained absorptivity ingredient was compressed from the result of an example 14 and the example 8 of a comparison being included.

[0171] [Example 15] The same reaction, actuation, etc. as an example 4 were performed, and the sheet-like absorptivity ingredient was obtained. Next, the above-mentioned absorptivity ingredient was cut in 12cmx25cm magnitude. On the other hand, the nonwoven fabric was cut from the paper diaper called the panpass L size (trade name) by the Procter & Gamble Co. (P&G) to ejection, and this nonwoven fabric was cut in the same magnitude as an absorptivity ingredient. And the simple absorber as an absorptivity article was formed by laying a nonwoven fabric on top of an absorptivity ingredient.

[0172] The engine performance of the above-mentioned simple absorber was measured by the following approaches. That is, the simple absorber was laid on the acrylic board and the acrylic board was laid on this simple absorber. The upper acrylic board equips the location corresponding to the center section of a simple absorber with the liquid filling pipe with a bore of 23mm. And to the simple absorber, weight was laid in the upper acrylic board so that the load of 23 g/cm² could be added to homogeneity.

[0173] From the event of pouring 50ml of physiological salines into a liquid filling pipe, and pouring a physiological saline into a liquid filling pipe in this condition, time amount until a physiological saline is altogether absorbed by the simple absorber was measured, and this time amount was made into absorption time amount (second). Moreover, 5 minutes after repeating this actuation a total of 3 times every 5 minutes and performing 3rd actuation, an upper acrylic board and upper weight were removed, and after laying ten kitchen towels called NEPIA by NEW OJ PAPER CO., LTD. on a simple absorber, an upper acrylic board and upper weight were laid again. The above-mentioned kitchen towel measured weight beforehand.

[0174] 1 minute after performing this actuation, the weight of ejection and this kitchen towel was measured for the ten above-mentioned kitchen towels. And weight which subtracted the weight before actuation from the weight after actuation was made into the amount of return (g).

[0175] Consequently, 1st absorption time amount 535 seconds and the 2nd absorption time amount are 1185 seconds and the 3rd

absorption time amount. It is 610 seconds and is the amount of return. It was 11.97g.

[0176]

[Effect of the Invention] The absorptivity resin of this invention according to claim 1 is the configuration of swelling as mentioned above so that it may have an anisotropy by water absorption. Moreover, for the absorptivity resin of this invention according to claim 2, as mentioned above, it sets to absorptivity resin according to claim 1, and a compression ratio is 2-1,000. It is the configuration compressed to become within the limits.

[0177] According to the above-mentioned configuration, it excels in various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, and the effectiveness that the absorptivity resin used suitable for an absorptivity ingredient can be offered is done so.

[0178] That is, the hydrophilic cross-linked-polymer particle as absorptivity resin concerning this invention is compressed by an aquosity solvent being desorbed from the three-dimensional network of this water gel particle, in case the water gel particle of for example, the hydrophilic cross linked polymer is pressurized. Therefore, distortion by compression has arisen in the three-dimensional network of this absorptivity resin. For this reason, this absorptivity resin has strain energy inside, and that it should recover in the condition before compression, if it contacts water, it will swell it so that water may be absorbed quickly and it may have an anisotropy. In this invention, a compression ratio expresses the degree of compression of the above-mentioned desirable, and at least one or more kinds of compounds containing an acrylic acid (meta) (salt) are still more desirable.

absorption rate and an absorption scale factor under application of pressure, as for the above-mentioned absorptivity resin, it is desirable to be compressed so that a compression ratio becomes above-mentioned within the limits. Thus, the absorptivity resin of this invention is excellent in especially various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, when the force which it is going to recover in the condition before compression works to the structure of cross linkage which was able to be distorted by compression.

[0179] The absorptivity ingredient of this invention according to claim 3 is a configuration currently fabricated in the shape of [of 1,000 or less mgf] a sheet including absorptivity resin according to claim 1 or 2 whenever flexible as mentioned above.

[0180] According to the above-mentioned configuration, since the absorptivity resin of this invention is excellent in especially various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, the absorptivity ingredient containing the above-mentioned absorptivity resin is also excellent in especially various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure. And when the above-mentioned absorptivity ingredient contains polyhydric alcohol, flexibility, reinforcement, cushioning properties, etc. can be raised. Moreover, when the above-mentioned absorptivity ingredient contains a shaping auxiliary material, while the firmness of this absorptivity ingredient becomes much more good, flexibility and reinforcement can be raised further. By the above-mentioned absorptivity ingredient being fabricated in the shape of [of 1,000 or less mgf] a sheet, whenever flexible, this absorptivity ingredient does so the effectiveness that the so-called feeling of software and a good usage feeling can be given to these hygienic goods (absorptivity article), when it excels in flexibility and this absorptivity ingredient is used for hygienic goods (absorptivity article), such as a diaper and a sanitary napkin.

[0181] The absorptivity ingredient of this invention according to claim 4 is the configuration of swelling in an absorptivity ingredient according to claim 3 as mentioned above so that it may have curvature by water absorption.

[0182] According to the above-mentioned configuration, even if it is a plane sheet, the absorptivity ingredient of this invention curls so that it may have curvature at the time of water absorption swelling, because said absorptivity resin swells so that it may have an anisotropy that it should recover in the condition before compression. For this reason, when this absorptivity ingredient is used for hygienic goods (absorptivity article), such as a diaper and a sanitary napkin, a shape is fitted by curling so that this absorptivity ingredient may draw a curve along with a bodily radius of circle at the time of water absorption, and the effectiveness that liquid leakage at bulb can be prevented is done so.

[0183] The manufacture approach of the absorptivity ingredient of this invention according to claim 5 is the configuration of decreasing moisture as mentioned above while pressurizing the water gel of the hydrophilic cross linked polymer. The manufacture approach of the absorptivity ingredient of this invention according to claim 6 is a configuration in which the above-mentioned water gel contains polyhydric alcohol further in the manufacture approach of an absorptivity ingredient according to claim 5 as mentioned above. The manufacture approach of the absorptivity ingredient of this invention according to claim 7 is a configuration which is within the limits whose moisture content in the above-mentioned water gel is 30 % of the weight - 90 % of the weight as mentioned above in the manufacture approach of an absorptivity ingredient according to claim 5 or 6. The manufacture approach of the absorptivity ingredient of this invention according to claim 8 is a configuration heated to application of pressure and coincidence so that a temperature gradient may arise in the 1st page of this sheet, and the 2nd page while it rolls out the above-mentioned water gel and makes it the shape of a sheet as mentioned above in the manufacture approach of claims 5 and 6 or an absorptivity ingredient given in seven.

[0184] According to the above-mentioned configuration, the absorptivity ingredient which is excellent in especially various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, can be offered including the absorptivity resin which has said property. Moreover, while being easy to fabricate in the shape of a sheet because the water gel of the above-mentioned hydrophilic cross linked polymer contains polyhydric alcohol further and being able to obtain a direct sheet-like absorptivity ingredient from water gel by it, the absorptivity ingredient which is excellent in flexibility, reinforcement, cushioning properties, etc. can be obtained. Moreover, a surface cross linking agent can be used together, or configuration mneme can be further raised by specifying mean particle diameter, desiccation mean particle diameter, etc. of the class of principal chain of the moisture content and the amount of meltable components in the water gel of the

above-mentioned hydrophilic cross linked polymer, and the hydrophilic cross linked polymer, and water gel.

[0185] And according to the above-mentioned approach, the absorptivity ingredient with which this hydrophilic cross linked polymer was fixed can be manufactured, without once making the water gel of the hydrophilic cross linked polymer, i.e., the water gel of absorptivity resin, into the shape of powder. Therefore, since the various processes of drying, and grinding and sifting out become unnecessary, while dust is not generated, handling becomes easy and work environment is improved, a production process is simplified and productivity can be raised. Thereby, an absorptivity ingredient can be manufactured cheaply and easily. And according to the above-mentioned approach, the hydrophilic cross linked polymer, i.e., an absorptivity ingredient with more contents of absorptivity resin than before, can be manufactured.

[0186] Furthermore, since water gel is rolled out and it is made the shape of a sheet while being able to give flexibility and reinforcement to the absorptivity ingredient obtained according to the above-mentioned approach, this absorptivity ingredient can be rolled round on a roll etc., or tension can be applied. Thereby, an absorptivity ingredient can be manufactured continuously.

[0187] Moreover, in case the above-mentioned water gel is rolled out and it is made the shape of a sheet, a difference arises in extent [structure of cross linkage / of said absorptivity resin] of distortion at the 1st page of a sheet, and the 2nd page by heating to application of pressure and coincidence so that a temperature gradient may arise in the 1st page of a sheet, and the 2nd page. For this reason, the stability of absorptivity resin differs by the 1st page of a sheet, and the 2nd page at the time of water absorption and swelling, and this absorptivity ingredient is swollen by making a damp region into the inside, curling so that it may have curvature. Therefore, according to the above-mentioned configuration, when this absorptivity ingredient is used for hygienic goods (absorptivity article), such as a diaper and a sanitary napkin, a shape is fitted and the effectiveness that liquid leakage at bulb can be prevented is collectively done so.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to an absorptivity ingredient and its manufacture approach at the absorptivity resin list used suitable for various applications, such as medical ingredients, such as hygienic goods, such as for example, a paper diaper (disposable diaper), and a sanitary napkin, the so-called incontinentia pad, a dew condensation water absorption sheet, water retention material for plantation arts, water cutoff material for engineering works, and a medical sheet, food-grade freshness maintenance material, and a food-grade drip absorber.

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PRIOR ART

[Description of the Prior Art] The absorptivity ingredient aiming at making body fluid absorb is broadly used for hygienic goods, such as a recent-years, for example, paper, diaper, and a sanitary napkin, the so-called incontinentia pad, as the component. Generally, the above-mentioned absorptivity ingredient is manufactured by performing processing of embossing etc. to this sheet etc., after performing processing of embossing etc. to this paper etc., or mixing pulp etc. with absorptivity resin, after pinching the absorptivity resin of the shape of the shape of powder, or a particle in paper etc., and creating a sheet, a film, etc. Moreover, using thermoplastics etc. and enclosing absorptivity resin with a base material instead of the above-mentioned processing, is also performed.

[0003] As an approach of fabricating absorptivity resin the shape of a sheet, and in the shape of a film, and manufacturing an absorptivity ingredient, it is Provisional Publication No. After pinching the mixture which comes to mix the absorptivity resin and polyhydric alcohol of the shape of dry powder on the fluororesin sheet which is a base material, the approach of pressurizing this sheet is indicated by 53 No. -141357 official report and U.S. Pat. No. 4,066,583. Moreover, the paper diaper which is an absorptivity article is indicated by the absorptivity ingredient using the dry powder-like absorptivity resin which consists of polyacrylic acid (salt), polysaccharide, etc., and the list at JP,3-174414,A and U.S. Pat. No. 5,145,906.

[0004] Furthermore, aquosity liquid is added, a hydrate is formed in dry powder-like absorptivity resin so that it may become 20 % of the weight - 80% of the weight of AUW, and the approach of fixing this hydrate to a base material by extrusion or spraying is indicated by JP,1-230671,A and U.S. Pat. No. 4,826,880. Moreover, dry powder-like absorptivity resin is fixed to a base material, and the approach of sheet-izing is indicated by U.S. Pat. No. 5,428,076.

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EFFECT OF THE INVENTION

[Effect of the Invention] The absorptivity resin of this invention according to claim 1 is the configuration of swelling as mentioned above so that it may have an anisotropy by water absorption. Moreover, for the absorptivity resin of this invention according to claim 2, as mentioned above, it sets to absorptivity resin according to claim 1, and a compression ratio is 2-1,000. It is the configuration compressed to become within the limits.

[0177] According to the above-mentioned configuration, it excels in various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, and the effectiveness that the absorptivity resin used suitable for an absorptivity ingredient can be offered is done so.

[0178] That is, the hydrophilic cross-linked-polymer particle as absorptivity resin concerning this invention is compressed by an aquosity solvent being desorbed from the three-dimensional network of this water gel particle, in case the water gel particle of for example, the hydrophilic cross linked polymer is pressurized. Therefore, distortion by compression has arisen in the three-dimensional network of this absorptivity resin. For this reason, this absorptivity resin has strain energy inside, and that it should recover in the condition before compression, if it contacts water, it will swell it so that water may be absorbed quickly and it may have an anisotropy. In this invention, a compression ratio expresses the degree of compression of the above-mentioned absorptivity resin. And in order to acquire sufficient improvement effectiveness of absorption properties, such as a water absorption rate and an absorption scale factor under application of pressure, as for the above-mentioned absorptivity resin, it is desirable to be compressed so that a compression ratio becomes above-mentioned within the limits. Thus, the absorptivity resin of this invention is excellent in especially various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, when the force which it is going to recover in the condition before compression works to the structure of cross linkage which was able to be distorted by compression.

[0179] The absorptivity ingredient of this invention according to claim 3 is a configuration currently fabricated in the shape of [of 1,000 or less mgf] a sheet including absorptivity resin according to claim 1 or 2 whenever flexible as mentioned above.

[0180] According to the above-mentioned configuration, since the absorptivity resin of this invention is excellent in especially various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, the absorptivity ingredient containing the above-mentioned absorptivity resin is also excellent in especially various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure. And when the above-mentioned absorptivity ingredient contains polyhydric alcohol, flexibility, reinforcement, cushioning properties, etc. can be raised. Moreover, when the above-mentioned absorptivity ingredient contains a shaping auxiliary material, while the firmness of this absorptivity ingredient becomes much more good, flexibility and reinforcement can be raised further. By the above-mentioned absorptivity ingredient being fabricated in the shape of [of 1,000 or less mgf] a sheet, whenever flexible, this absorptivity ingredient does so the effectiveness that the so-called feeling of software and a good usage feeling can be given to these hygienic goods (absorptivity article), when it excels in flexibility and this absorptivity ingredient is used for hygienic goods (absorptivity article), such as a diaper and a sanitary napkin.

[0181] The absorptivity ingredient of this invention according to claim 4 is the configuration of swelling in an absorptivity ingredient according to claim 3 as mentioned above so that it may have curvature by water absorption.

[0182] According to the above-mentioned configuration, even if it is a plane sheet, the absorptivity ingredient of this invention curls so that it may have curvature at the time of water absorption swelling, because said absorptivity resin swells so that it may have an anisotropy that it should recover in the condition before compression. For this reason, when this absorptivity ingredient is used for hygienic goods (absorptivity article), such as a diaper and a sanitary napkin, a shape is fitted by curling so that this absorptivity ingredient may draw a curve along with a bodily radius of circle at the time of water absorption, and the effectiveness that liquid leakage at bulb can be prevented is done so.

[0183] The manufacture approach of the absorptivity ingredient of this invention according to claim 5 is the configuration of decreasing moisture as mentioned above while pressurizing the water gel of the hydrophilic cross linked polymer. The manufacture approach of the absorptivity ingredient of this invention according to claim 6 is a configuration in which the above-mentioned water gel contains polyhydric alcohol further in the manufacture approach of an absorptivity ingredient according to claim 5 as mentioned above. The manufacture approach of the absorptivity ingredient of this invention according to claim 7 is a configuration which is within the limits whose moisture content in the above-mentioned water gel is 30 % of the weight - 90 % of the weight as mentioned above in the manufacture approach of an absorptivity ingredient according to claim 5 or 6. The manufacture approach of the absorptivity ingredient of this invention according to claim 8 is a configuration heated to application of pressure and coincidence so that a temperature gradient may arise in the 1st page of this sheet, and the 2nd page

while it rolls out the above-mentioned water gel and makes it the shape of a sheet as mentioned above in the manufacture approach of claims 5 and 6 or an absorptivity ingredient given in seven.

[0184] According to the above-mentioned configuration, the absorptivity ingredient which is excellent in especially various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, can be offered including the absorptivity resin which has said property. Moreover, while being easy to fabricate in the shape of a sheet because the water gel of the above-mentioned hydrophilic cross linked polymer contains polyhydric alcohol further and being able to obtain a direct sheet-like absorptivity ingredient from water gel by it, the absorptivity ingredient which is excellent in flexibility, reinforcement, cushioning properties, etc. can be obtained. Moreover, a surface cross linking agent can be used together, or configuration mnemonic can be further raised by specifying mean particle diameter, desiccation mean particle diameter, etc. of the class of principal chain of the moisture content and the amount of meltable components in the water gel of the above-mentioned hydrophilic cross linked polymer, and the hydrophilic cross linked polymer, and water gel.

[0185] And according to the above-mentioned approach, the absorptivity ingredient with which this hydrophilic cross linked polymer was fixed can be manufactured, without once making the water gel of the hydrophilic cross linked polymer, i.e., the water gel of absorptivity resin, into the shape of powder. Therefore, since the various processes of drying, and grinding and sifting out become unnecessary, while dust is not generated, handling becomes easy and work environment is improved, a production process is simplified and productivity can be raised. Thereby, an absorptivity ingredient can be manufactured cheaply and easily. And according to the above-mentioned approach, the hydrophilic cross linked polymer, i.e., an absorptivity ingredient with more contents of absorptivity resin than before, can be manufactured.

[0186] Furthermore, since water gel is rolled out and it is made the shape of a sheet while being able to give flexibility and reinforcement to the absorptivity ingredient obtained according to the above-mentioned approach, this absorptivity ingredient can be rolled round on a roll etc., or tension can be applied. Thereby, an absorptivity ingredient can be manufactured continuously.

[0187] Moreover, in case the above-mentioned water gel is rolled out and it is made the shape of a sheet, a difference arises in extent [structure of cross linkage / of said absorptivity resin] of distortion at the 1st page of a sheet, and the 2nd page by heating to application of pressure and coincidence so that a temperature gradient may arise in the 1st page of a sheet, and the 2nd page. For this reason, the stability of absorptivity resin differs by the 1st page of a sheet, and the 2nd page at the time of water absorption and swelling, and this absorptivity ingredient is swollen by making a damp region into the inside, curling so that it may have curvature. Therefore, according to the above-mentioned configuration, when this absorptivity ingredient is used for hygienic goods (absorptivity article), such as a diaper and a sanitary napkin, a shape is fitted and the effectiveness that liquid leakage at bulb can be prevented is collectively done so.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, the above-mentioned Provisional Publication No. Once drying, grinding and sifting out the water gel obtained by the polymerization reaction and manufacturing powder-like absorptivity resin, it carries out mixing this absorptivity resin with a base material etc., and is fabricating by the manufacture approach given in 53 No. -141357 official report, U.S. Pat. No. 4,066,583, JP,3-174414,A, and U.S. Pat. No. 5,145,906 the shape of a sheet, and in the shape of a film. Therefore, work environment becomes inferior while handling is difficult, since dust is generated in case absorptivity resin is made into the shape of powder. And the problem of decline in the yield of absorptivity resin, as a result the yield of the mold goods obtained eventually arises. Moreover, it also has the trouble that the production process which manufactures an absorptivity ingredient is complicated, and an absorptivity ingredient cannot be manufactured cheaply.

[0006] In addition, in the above-mentioned conventional manufacture approach, in order to prevent gel blocking of absorptivity resin particles, the amount of the absorptivity resin particle blended into a fibrous matrix must be lessened comparatively.

Therefore, it is difficult to manufacture an absorptivity ingredient with comparatively many contents of absorptivity resin.

[0007] Moreover, the absorptivity ingredient obtained by the above-mentioned conventional manufacture approach is deficient in flexibility (flexibility) or reinforcement. For this reason, this absorptivity ingredient cannot be rolled round on a roll etc., or since it is difficult to apply tension (tension), an absorptivity ingredient cannot be manufactured continuously. Furthermore, if hygienic goods (absorptivity article), such as a paper diaper, are manufactured using the above-mentioned absorptivity ingredient, it also has the trouble that the touch (the so-called feeling of software and the so-called usage feeling) of the hygienic goods obtained serves as a defect.

[0008] Moreover, an approach given in JP,1-230671,A, U.S. Pat. No. 4,826,880, and U.S. Pat. No. 5,428,076 also becomes complicated [a compound chemically-modified / of a base material and absorptivity resin powder / degree], while base materials, such as a nonwoven fabric for holding a sheet condition, are required separately in order to sheet-ize once obtaining dry powder-like absorptivity resin. Moreover, it also has the trouble that dust is generated during sheet-izing. And the obtained absorptivity ingredient has the inadequate flexibility of a sheet, a water absorption rate and the absorption scale factor under application of pressure are also small, the absorptivity resin weight per unit area decreases from the firmness of a sheet, and a water absorption property tends to become inadequate.

[0009] Thus, it is hard to say each absorptivity ingredient obtained by the above-mentioned conventional manufacture approach that various absorption properties and firmness, such as a water absorption rate and an absorption scale factor under application of pressure, are enough. For this reason, much of the absorptivity ingredient which is further excellent in various absorption properties, firmness and flexibility, reinforcement, etc. is expected.

[0010] This invention is made in view of the above-mentioned conventional trouble, and the main object is in providing the absorptivity resin list excellent in various absorption properties and firmness, such as rate of absorption and an absorption scale factor under application of pressure, with an absorptivity ingredient. Moreover, by simplifying a production process, productivity is raised and it is in this offering the manufacture approach of an absorptivity ingredient that an absorptivity ingredient can be manufactured cheaply.

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EXAMPLE

[Example] Hereafter, although an example and the example of a comparison explain this invention to a detail further, this invention is not limited at all by these. In addition, many engine performance of an absorptivity ingredient was measured by the following approaches.

[0118] (a) Cut the absorptivity ingredient of the shape of water content point ** and a sheet in 10cmx10cm magnitude, and it is the weight W0 of this absorptivity ingredient (a cutting sheet is called hereafter). (g) was measured. Next, the above-mentioned cutting sheet was put into the oven (the Tokyo science appliance incorporated company make: type NDO-450) by which temperature control was carried out to 180 degree C, and was left for 3 hours. Subsequently, after having taken out the cutting sheet, laying in the desiccator with which silica gel is in close and cooling radiationally for 5 minutes, the weight W1 (g) was measured. these weight W0 and W1 from -- according to a degree type and water content (% of the weight) = [(weight W0(g)-weight W1 (g)) / weight W0 (g)] x100, water content (% of the weight) was computed. [and]

[0119] (b) Absorption scale-factor absorptivity ingredient It was immersed into [after putting 0.2g into the tea bag type bag made of a nonwoven fabric (60mmx60mm) and heat sealing opening] the 0.9-% of the weight sodium chloride water solution (physiological saline). A tea bag type bag is pulled up after 30 minutes, and a centrifugal separator is used. Weight W2 of a tea bag type bag after performing a ridge for 3 minutes by 250G (g) was measured. Moreover, same actuation is performed without using an absorptivity ingredient, and it is weight W3 at that time. (g) was measured. and these weight W2 and W3 from -- a degree type and absorption scale factor the weight (g) of (g/g)= (weight W2(g)-weight W3 (g)) / absorptivity ingredient -- following -- absorption scale factor (g/g) It computed.

[0120] (c) Absorption scale-factor point ** under application of pressure, bore It is a diameter in 160mm and a glass petri dish with a height of 20mm. On this petri dish after laying a 120mm glass filter plate (G#1) Brine was poured out 0.4% of the weight. This brine was made into an amount the water surface of this brine and whose top face of the above-mentioned filter plate correspond mostly. Next, the filter paper (Toyo Roshi [Kaisha, Ltd.] make: TOYO FILTER PAPER No.2) was laid on the filter plate.

[0121] And when an absorptivity ingredient is a sheet-like, it is the absorptivity ingredient of the shape of this sheet. It cuts in the magnitude of 3.1cmx 3.1cm, and is the weight W4 of this absorptivity ingredient (a cutting sheet is called hereafter). (g) was measured. Moreover, the support cylinder was created by fixing the wire gauze made from stainless steel of 400 meshes to the pars basilaris ossis occipitalis of the cylinder made of acrylic resin with a bore [of 55mm], and a height of 60mm. Next, the measurement cylinder was created by laying the above-mentioned cutting sheet in a support cylinder (i.e., a wire gauze top), and laying the plunger made from brass of the shape of a cylinder as weight on this cutting sheet further. The weight is adjusted so that a plunger can add the load of 50 g/cm² to homogeneity to a cutting sheet. (And the above-mentioned cutting sheet, a support cylinder, and the weight W5 of the sum total of a plunger, i.e., weight of a measurement cylinder, (g) was measured.)

[0122] Subsequently, this measurement cylinder was laid on the above-mentioned filter paper. And the cutting sheet in a measurement cylinder was made to absorb the above-mentioned brine over 30 minutes from the event of laying a measurement cylinder on a filter paper. On that is, a cutting sheet 0.4-% of the weight brine was made to absorb under application of pressure. moreover, the water surface of the above-mentioned brine and the top face of a filter plate are mostly in agreement so that the amount of the above-mentioned brine may serve as about 1 law in the meantime -- as -- petri dish 0.4-% of the weight brine -- suitably -- pouring -- a guide peg -- the bottom. Weight W6 of after the progress during 30 minutes, and a measurement cylinder (g) was measured. these weight W4, W5, and W6 from -- a degree type and absorption scale factor under application of pressure (g/g)= (weight W6(g)-weight W5 (g)) / weight W4 (g) -- following -- absorption scale factor under application of pressure (g/g) It computed. [and]

[0123] On the other hand, when an absorptivity ingredient was powdered, it replaced with the sheet of 3.1cmx 3.1cm, the absorptivity ingredient of 0.9 g was sprinkled to homogeneity inside said cylinder made of acrylic resin, and the absorption scale factor under the load of 50 g/cm² was measured similarly hereafter. And a top type is followed and it is an absorption scale factor under application of pressure. (g/g) It computed.

[0124] (d) When a rate-of-absorption absorptivity ingredient was a sheet-like, first, the sheet-like absorptivity ingredient was cut in 2.54cmx2.54cm (1 square inch) magnitude, and the weight of this absorptivity ingredient (a cutting sheet is called hereafter) was measured. On the other hand, the container made from polypropylene with a bore [of 55mm] and a height of 15mm was filled with the physiological saline of weight 10 times to the weight of a cutting sheet. Subsequently, the cutting sheet was thrown in in this physiological saline. And from the event of throwing in a cutting sheet in a physiological saline, time amount until a physiological saline is altogether absorbed by the cutting sheet was measured, and this time amount was made into rate of

absorption (second). It judged whether the physiological saline was altogether absorbed by the cutting sheet by whether the container made from polypropylene is leaned to 45 degrees, and the liquid reservoir of this physiological saline is generated. That is, the event of a liquid reservoir not being generated was considered as the event of a physiological saline being altogether absorbed by the cutting sheet.

[0125] Moreover, when an absorptivity ingredient was powdered, it replaced with the 2.54cmx2.54cm sheet, and rate of absorption was hereafter measured similarly using the 1g absorptivity ingredient.

[0126] (e) Flexibility flexibility was measured only about the sheet-like absorptivity ingredient, and the method was followed whenever the measuring method was [gar rhe ** / which was specified to JISL 1096] flexible. In addition, flexibility shows that flexibility is so high that the value (whenever [flexible]) measured by this approach is small.

[0127] [Example 1] The diameter of a revolution The double arm mold kneader made from stainless steel with a jacket of content volume 10L who has two sigma mold wings which are 120mm was used as the reactor. This kneader has the lid which seals the inside of a system, and the application-of-pressure lid which can apply the pressure of 66kg to contents. To the above-mentioned reactor, they are an acrylic acid as a monomer component, and the 38-% of the weight water solution of acrylic-acid sodium (75 mol % of neutralization indices). After teaching 5,000g and trimethylolpropane triacrylate 2.85g as a cross linking agent and considering as reaction mixture, nitrogen gas was blown and nitrogen inert gas replacement of the system was carried out. They are the amount of the trimethylolpropane triacrylate used to a monomer component, and 0.045-mol %.

[0128] Next, 30-degree C warm water was stirred in the jacket, warming through and reaction mixture. Then, when the sodium persulfate and L-ascorbic acid as a polymerization initiator were added to reaction mixture, stirring, the polymerization began after about 1 minute. The amount of the sodium persulfate used to a monomer component is 0.12-mol %, and is the amount of the L-ascorbic acid used, and 0.005-mol %.

[0129] And after performing a polymerization for 60 minutes at 30 degrees C, the application-of-pressure lid was put on the obtained massive water gel (contents), it stirred for 20 minutes, and this water gel was subdivided. Thereby, particle diameter The water gel subdivided by 0.2mm - 0.8 mm was obtained. The solid content of this water gel was 38 % of the weight.

[0130] Subsequently, the subdivided above-mentioned water gel 800g was taught to the above-mentioned kneader and the kneader who has the same configuration. Moreover, mixed liquor (glycerol 33.8g as polyhydric alcohol and ethylene-glycol-diglycidyl-ether (Nagase Brothers formation industrial incorporated company make; trade name DENAKORU EX- 810) 0.31g as a surface cross linking agent) was prepared. Next, 70-degree C warm water was stirred in the jacket, warming through and water gel. Then, stirring, it stirred until it added the above-mentioned mixed liquor to this water gel and both were mixed at homogeneity. Solid content of water gel The amount of the glycerol used to the 100 weight sections is the 11.1 weight sections, and is the amount of the ethylene glycol diglycidyl ether used, and the 0.1 weight sections.

[0131] Next, 10.4g (shaping auxiliary material) of polyester fiber with a die length of 2mm - 3mm which becomes the obtained mixture from polyethylene terephthalate was added little by little, and it kneaded until the lump of this fiber was lost. Solid content of water gel They are the addition of the polyester fiber to the 100 weight sections, and the 3.4 weight sections. This obtained the water gel constituent.

[0132] Then, while rolling out the above-mentioned water gel constituent using the compression equipment put side by side in an open-end single drum dryer (type by KATSURAGI Industries, and NRXM750-N35C), and a list, it is the above-mentioned water gel constituent (I) by the dryer drum. The contact surface with the dryer drum which can be set It heated at 150 degrees C. Then, the obtained sheet was scratched using the scraper from the dryer drum front face. Thereby, it is the thickness of 0.8mm. The sheet-like absorptivity ingredient was obtained. The main manufacture conditions of a water gel constituent were indicated to a table 1.

[0133] Basis weight of the obtained absorptivity ingredient 490 g/m² and water content The absorption scale factor was [25.2 g/g and the rate of absorption of the absorption scale factor under 30.2 g/g and application of pressure] 68 seconds 7.5% of the weight. These measurement result was indicated according to a table 2.

[0134] [Example 1 of a comparison] It is only with a drum dryer, without using a compression equipment for the obtained water gel constituent in an example 1. It sheet-sized, without heating and rolling out at 150 degrees C. Then, the obtained sheet was scratched using the scraper from the dryer drum front face. This obtained the sheet-like absorptivity ingredient. The measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0135] [Example 2 of a comparison] The water gel constituent was rolled out in the example 1, without heating a dryer drum. This sheet-sized the water gel constituent, without decreasing the moisture of water gel. Then, the obtained sheet was scratched using the scraper from the dryer drum front face (temperature of 25 degrees C). This obtained the sheet-like absorptivity ingredient. The measurement result of the obtained absorptivity ingredient was indicated according to a table 2. In addition, the shape retaining property of the obtained absorptivity ingredient was low, and measurement whenever flexible was impossible.

[0136] [Example 3 of a comparison] It is temperature about the absorptivity ingredient of the shape of a sheet acquired in the example 2 of a comparison. It put into the hot blast circulation type dryer kept at 105 degrees C, and it was dried. That is, the moisture was decreased after rolling out water gel. The measurement result of this absorptivity ingredient was indicated according to a table 2.

[0137] [Example 2] It replaced with the mixed liquor in an example 1, and except having used glycerol 76g, the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. Solid content of water gel The amount of the glycerol used to the 100 weight sections is 25 weight sections. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0138] [Example 3] It replaced with the mixed liquor in an example 1, and except having used mixed liquor (glycerol 76g and ethylene-glycol-diglycidyl-ether 0.31g), the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0139] [Example 4] It replaced with the mixed liquor in an example 1, and except having used mixed liquor (glycerol 76g and ethylene-glycol-diglycidyl-ether 1.53g), the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. Solid content of water gel They are the amount of the ethylene glycol diglycidyl ether used to the 100 weight sections, and the 0.5 weight sections. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0140] [Example 5] While replacing with the mixed liquor in an example 1 and using mixed liquor (glycerol 76g and ethylene-glycol-diglycidyl-ether 1.53g), except having changed the addition of polyester fiber into 16.0g from 10.4g, the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. Solid content of water gel They are the addition of the polyester fiber to the 100 weight sections, and the 5.3 weight sections. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0141] [Example 6] It replaces with the mixed liquor in an example 1, and is a glycerol. Except having used 304g, the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. Solid content of water gel They are the amount of the glycerol used to the 100 weight sections, and the 100 weight sections. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0142] [Example 7] While changing the charge of the trimethylolpropane triacrylate in an example 1 into 1.27g from 2.85g, it replaced with the mixed liquor in an example 1, and except having used mixed liquor (glycerol 76g and ethylene-glycol-diglycidyl-ether 1.53g), the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. The amount of the trimethylolpropane triacrylate used to a monomer component is 0.02-mol %. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0143] [Example 8] It replaces with the 38-% of the weight water solution of the acrylic-acid sodium in an example 7, and they are an acrylic acid as a monomer component, and the 30-% of the weight water solution of acrylic-acid sodium (75 mol % of neutralization indices). While using 5,000g, it replaced with trimethylolpropane triacrylate, and except having used polyethylene-glycol diacrylate (eight average addition mols of ethylene glycol) 7.18g as a cross linking agent, the same reaction, actuation, etc. as an example 7 were performed, and the sheet-like absorptivity ingredient was obtained. The amount of the polyethylene-glycol diacrylate used to a monomer component is 0.07-mol %. Moreover, the solid content of water gel was 30 % of the weight. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0144] [Example 9] While replacing with the mixed liquor in an example 1 and using mixed liquor (glycerol 76g and ethylene-glycol-diglycidyl-ether 0.31g), except not using polyester fiber (it not adding), the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0145] [Example 10] While replacing with the mixed liquor in an example 1 and using mixed liquor (glycerol 76g and ethylene-glycol-diglycidyl-ether 1.53g), it replaced with polyester fiber, and except having used 76g (shaping auxiliary material) of pulp fiber with a fiber length of about 10mm - 20mm, the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. Solid content of water gel The addition of the pulp fiber to the 100 weight sections is 25 weight sections. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0146] [Example 11] In the example 1, except having changed the fiber length of polyester fiber into about 20mm - 30mm, the same reaction, actuation, etc. as an example 1 were performed, and the sheet-like absorptivity ingredient was obtained. ***** and rate of absorption at the time of desiccation of this absorptivity ingredient and swelling were further superior to the absorptivity ingredient obtained in the example 1. The main manufacture conditions of a water gel constituent were indicated to a table 1. Moreover, the measurement result of the obtained absorptivity ingredient was indicated according to a table 2.

[0147]

[A table 1]

		固形分 (重量%)	トリメチロールプロパン トリアクリレート (モル%)	グリセリン (重量部)	エチレングリコールジグリジルエーテル (重量部)	ポリエステル繊維 (重量部)	ポリエステル繊維 (mm)
実 施 例	1	3.8	0.045	11.1	0.1	3.4	2~3
	2	3.8	0.045	2.5	0	3.4	2~3
	3	3.8	0.045	2.5	0.1	3.4	2~3
	4	3.8	0.045	2.5	0.5	3.4	2~3
	5	3.8	0.045	2.5	0.5	5.3	2~3
	6	3.8	0.045	1.00	0	3.4	2~3
	7	3.8	0.02	2.5	0.5	3.4	2~3
	8	3.0	(ポリエチレングリコールジ アクリレート) 0.07	2.5	0.5	3.4	2~3
	9	3.8	0.045	2.5	0.1	0	2~3
	10	3.8	0.045	2.5	0.5	(パラ繊維) 2.5	1.0 ~2.0
	11	3.8	0.045	11.1	0.1	3.4	2.0 ~3.0

[0148]

[A table 2]

	坪 量 (g/m ²)	含 水 率 (重量%)	吸 收 倍 率 (g/g)	加 压 下 的 吸 收 倍 率 (g/g)	吸 收 速 度 (秒)	柔 軟 度 (mgf)
実施例 1	4.90	7.5	30.2	25.2	6.8	750
比較例 1	5.10	8.2	29.8	24.4	9.2	930
比較例 2	9.90	5.4.1	15.5	9.8	270	—
比較例 3	5.20	9.9	28.8	23.4	9.7	1020
実施例 2	7.53	11.2	32.1	15.3	114	520
実施例 3	4.74	16.2	24.2	25.1	71	260
実施例 4	5.09	17.4	20.5	27.5	47	160
実施例 5	2.73	12.9	22.2	27.5	23	490
実施例 6	11.08	17.8	21.6	17.8	83	310
実施例 7	4.70	14.2	21.5	27.7	31	300
実施例 8	5.10	20.0	18.1	26.7	36	150
実施例 9	6.50	12.5	25.7	27.0	9.2	500
実施例 10	10.56	6.6	18.2	22.9	55	1000
実施例 11	4.90	7.4	30.5	25.1	60	840

[0149] It turns out that the absorptivity ingredient which was further excellent in decreasing the moisture, pressurizing water gel from the result given in a table 2 with absorption properties, such as an absorption scale factor under application of pressure and rate of absorption, as compared with the case where heating or either of the application of pressure or heating, and application of pressure are performed independently even if it used the same water gel constituent can be obtained. Furthermore, according to this example, it turns out that the absorptivity ingredient of the shape of a sheet excellent in the absorption scale factor and rate of absorption under application of pressure, especially flexibility, etc. can be obtained.

[0150] moreover, the compression ratio of the absorptivity ingredient shown in the above-mentioned examples 1-11 when the compression ratio was measured about the absorptivity ingredient of the shape of a sheet shown in examples 1-11 -- 10-100 it is -- it turns out that the outstanding physical properties, such as high rate of absorption, are shown [the absorptivity ingredient of the examples 1-3 of a comparison which are the absorptivity ingredients of a compression ratio 1]. In addition, it can ask for the above-mentioned compression ratio similarly by the approach described above also about the absorptivity ingredient of the shape not only of the primary particle of water gel but a sheet. Moreover, each absorptivity resin in each above-mentioned absorptivity ingredient was that from which water absorption and swelling recover in the condition before compression (rolling), and good water absorption stability is acquired.

[0151] [Example 12] The same reaction, actuation, etc. as an example 1 were performed first, and water gel was obtained. Next, the same actuation as an example 1 etc. was performed, and it rolled out and heated without mixing a glycerol (polyhydric alcohol), ethylene glycol diglycidyl ether (surface cross linking agent), and polyester fiber (shaping auxiliary material) to this water gel. That is, rolling and heating of were done, using only water gel as a water gel constituent.

[0152] Then, obtained absorptivity ingredient 200g was broken, and it supplied to the mixer, it ground for 15 seconds, and it was presupposed that it is powdered. Next, it is an opening about the absorptivity ingredient of the shape of this powder. By classifying by the 500-micrometer JIS standard sieve, coarse grain was removed and the absorptivity ingredient of the shape of powder concerning this invention was obtained.

[0153] The above-mentioned absorptivity ingredient obtained by rolling out and heating the above-mentioned water gel was dramatically weak, and was not able to form a direct sheet-like absorptivity ingredient from a water gel constituent. That is, when water gel was rolled out and heated under the nonexistence of polyhydric alcohol, a sheet-like absorptivity ingredient was not able to be obtained. However, the absorption scale factor of the absorptivity ingredient of the shape of powder acquired by drying the above-mentioned absorptivity ingredient and classifying was able to obtain the absorptivity ingredient with which 11.3 g/g and rate of absorption are 25 seconds, and the absorption scale factor under 42.5 g/g and application of pressure excelled [rate of absorption] especially in these absorption property. The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0154] [Example 4 of a comparison] It sets in the example 12 and is water gel. Dry matter which dried by 160-degree C hot blast for 1 hour, and was obtained Opening after a desk grinder grinds 200g By classifying by the 500-micrometer JIS standard sieve, coarse grain was removed and the powder-like absorptivity ingredient was obtained. The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0155] [Example 5 of a comparison] In the example 4 of a comparison, hot press of the mixture of the powder-like absorptivity ingredient and polyhydric alcohol which were obtained was carried out to U.S. Pat. No. 4,066,583 based on the approach of a publication. That is, glycerol 2g as powder-like 8g of absorptivity ingredients and polyhydric alcohol obtained in the example 5 of a comparison was first taught to the predetermined container, and powdered mixture was obtained by mixing to homogeneity quickly. After opening this mixture in 10cmx10cm magnitude on a smooth plate at homogeneity, the above-mentioned mixture was reformed by putting into the air-conditioned room beforehand adjusted to the temperature of 25 degrees C, and 90% of relative humidity, and leaving it for 10 minutes. The mixture after humidification is the shape of a sheet which the powder absorptivity ingredient of the above condensed, and it had the firmness which is extent which can be raised slowly.

[0156] Next, the application-of-pressure machine of a heating mold is used for the sheet mixture of the above, and it is temperature. It pressurized for 5 minutes on condition that 150 degrees C and pressure 350 gf/cm². This obtained the transparent sheet-like moldings with a thickness of about 1mm. Subsequently, the sheet-like absorptivity ingredient was obtained by adding water to this sheet-like moldings, so that it may become 17.0 % of the weight of water content. The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0157] [Example 13] The same reaction, actuation, etc. as an example 1 were performed first, and water gel was obtained. Next, after mixing only ethylene-glycol-diglycidyl-ether 0.31g to this water gel, the same actuation as an example 1 etc. was performed, and it rolled out and heated. That is, rolling and heating of were done, using the mixture of water gel and ethylene glycol diglycidyl ether as a water gel constituent. Then, obtained absorptivity ingredient The same grinding as an example 12 and a classification were performed using 200g, and the powder-like absorptivity ingredient was obtained.

[0158] In this example, the above-mentioned absorptivity ingredient obtained by rolling out and heating a water gel constituent was dramatically weak, and was not able to form a direct sheet-like absorptivity ingredient from a water gel constituent. That is, since water gel was rolled out and heated under the nonexistence of polyhydric alcohol, a sheet-like absorptivity ingredient was not able to be obtained. However, absorption properties, such as rate of absorption and an absorption scale factor under application of pressure, and the absorptivity ingredient which was excellent in rate of absorption also especially in it were able to be obtained by heating the above-mentioned water gel constituent to rolling and coincidence. The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0159] [Example 6 of a comparison] Dry matter which dried by the hot blast of 160 degree C for 1 hour, and was obtained instead of setting in the example 13, and rolling out and heating a water gel constituent Opening after a desk grinder grinds 200g By classifying by the 500-micrometer JIS standard sieve, coarse grain was removed and the powder-like absorptivity ingredient was obtained. The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0160] [Example 7 of a comparison] Glycerol 2g was mixed into 8g of absorptivity ingredients of the shape of powder acquired in the example 6 of a comparison, the same actuation as the example 5 of a comparison was performed hereafter, and the transparent sheet-like moldings with a thickness of about 1mm was obtained. Subsequently, the sheet-like absorptivity ingredient was obtained by adding water to this sheet-like moldings, so that it may become 19.2 % of the weight of water content. The

measurement result of this absorptivity ingredient was indicated according to a table 3.

[0161] [an example 14] -- the reaction vessel of 20L which attached an agitator, a reflux cooler, a thermometer, nitrogen gas installation tubing, and a dropping funnel first -- the cyclohexane 10 as an aquosity solvent -- L and HLB (hydrophile-lypophile balance) 40g (Dai-Ichi Kogyo Seiyaku Co., Ltd. make; trade name DK-ester F-50) of sucrose fatty acid ester as a surfactant of 6 was taught and stirred. And after dissolving sucrose fatty acid ester in the above-mentioned cyclohexane, nitrogen gas was blown and nitrogen inert gas replacement of the reaction vessel was carried out.

[0162] On the other hand, they are an acrylic acid as a monomer component, and the 35-% of the weight water solution of acrylic-acid sodium (75 mol % of neutralization indices). To 3,030g, it is hydroxyethyl cellulose (die cel combination incorporated company make; trade name EP-850) as N [as a cross linking agent], and N'-methylenebis acrylamide 0.16g, and a thickener. 5.3 g was dissolved and the monomer water solution was prepared. Subsequently, potassium persulfate as a polymerization initiator after blowing nitrogen gas into the above-mentioned monomer water solution and driving out dissolved oxygen 1.6g was added and it was made to dissolve.

[0163] Then, the above-mentioned monomer water solution in which the polymerization initiator was dissolved was added in the solution in the above-mentioned reaction vessel, it considered as reaction mixture, this reaction mixture was stirred at 60 degrees C for 2 hours, and the opposite phase suspension polymerization was performed. Consequently, the globular form gel polymer was obtained. Subsequently, azeotropy dehydration of the obtained gel polymer is carried out in a reaction vessel, and it is mean particle diameter. The 480-micrometer spherical polymer dehydrate was obtained. Then, it is the particle size of this polymer dehydrate by classifying the above-mentioned polymer dehydrate by the JIS standard sieve. Step was kept with 500 micrometers - 600 micrometer.

[0164] Then, the above-mentioned polymer dehydrate after classification The cross linking agent water solution which becomes the 100 weight sections from the ethylene-glycol-diglycidyl-ether 0.05 section as a cross linking agent, the water 3 section, and the isopropanol 2 section was added, surface bridge formation was performed by 200 **, and the secondary cross linked polymer was obtained. since the above-mentioned secondary cross linked polymer decreased the moisture, without pressurizing the above-mentioned gel polymer -- mean particle diameter 480 micrometers -- true -- it was spherical.

[0165] Then, the water gel of 35 % of the weight of solid content was obtained by making the above-mentioned secondary cross linked polymer add and swell water. Water gel of the following **** and this secondary cross linked polymer was performed for the same actuation as an example 1 etc., and the powder-like absorptivity ingredient was obtained rolling and by heating.

[0166] The thickness of the average which measured each particle in this absorptivity ingredient, i.e., the secondary cross-linked-polymer particle after rolling / heating, (absorptivity resin), and 100 secondary cross-linked-polymer particles was the discoid whose average diameter is similarly 2.60mm 0.07mm. therefore, the shrinkage ratio X of the compression direction (the thickness direction) of the secondary cross-linked-polymer particle after above-mentioned rolling / heating -- the expansion ratio Y of 0.07/0.48 and the drawing direction -- 2.60/0.48 it is -- compression ratio Y/X specified by this invention is set to 37. That is, the secondary cross-linked-polymer particle in the above-mentioned absorptivity ingredient is compressed 37 times as compared with rolling / heating before. For this reason, the absorptivity ingredient which consists of the above-mentioned secondary cross-linked-polymer particle is high rate of absorption (48 seconds) by the strain energy which is inherent in this secondary cross-linked-polymer particle. It was shown, swelled the different direction at the time of water absorption, and recovered in the configuration before rolling / heating (spherical). The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0167] [Example 8 of a comparison] The same reaction, actuation, etc. as the above-mentioned example 14 were performed, and the secondary cross linked polymer was obtained. Many engine performance was measured for this secondary cross linked polymer as an absorptivity ingredient for a comparison as they were. That is, this absorptivity ingredient is not compressed but the compression ratio is 1. The measurement result of this absorptivity ingredient was indicated according to a table 3.

[0168]

[A table 3]

	坪量 (g/m ²)	含水率 (重量%)	吸収倍率 (g/g)	加圧下の吸収倍率 (g/g)	吸収速度 (秒)	柔軟度 (mgf)
実施例 1 2	粉末	6.5	42.5	11.3	2.5	—
比較例 4	粉末	6.4	42.0	10.0	3.5	—
比較例 5	9.28	17.0	31.5	4.5	6.80	41.0
実施例 1 3	粉末	5.1	34.6	28.4	2.1	—
比較例 6	粉末	5.2	34.0	27.8	3.2	—
比較例 7	9.63	19.2	22.4	9.8	5.80	38.0
実施例 1 4	粉末	5.1	45.3	27.4	2.5	—
比較例 8	粉末	0.5 >	44.4	27.0	4.8	—

[0169] Even if it uses the same water gel constituent by decreasing the moisture from a result given in a table 3, pressurizing water gel, as compared with the case only heated, without pressurizing, it turns out that the absorptivity ingredient of the shape of powder which was further excellent with the absorption scale factor and rate of absorption under application of pressure can be obtained. Moreover, by the conventional approach, once it makes it powder, the rate of absorption and absorption scale factor under application of pressure fall substantially by sheet-izing, and it turns out that the absorptivity ingredient of the shape of a sheet excellent in these absorption property cannot be obtained.

[0170] Moreover, distortion of the structure of cross linkage which this absorptivity resin has shows that rate of absorption becomes quick by the absorptivity resin with which the obtained absorptivity ingredient was compressed from the result of an example 14 and the example 8 of a comparison being included.

[0171] [Example 15] The same reaction, actuation, etc. as an example 4 were performed, and the sheet-like absorptivity ingredient was obtained. Next, the above-mentioned absorptivity ingredient was cut in 12cmx25cm magnitude. On the other hand, the nonwoven fabric was cut from the paper diaper called the panpass L size (trade name) by the Procter & Gamble Co. (P&G) to ejection, and this nonwoven fabric was cut in the same magnitude as an absorptivity ingredient. And the simple absorber as an absorptivity article was formed by laying a nonwoven fabric on top of an absorptivity ingredient.

[0172] The engine performance of the above-mentioned simple absorber was measured by the following approaches. That is, the simple absorber was laid on the acrylic board and the acrylic board was laid on this simple absorber. The upper acrylic board equips the location corresponding to the center section of a simple absorber with the liquid filling pipe with a bore of 23mm. And to the simple absorber, weight was laid in the upper acrylic board so that the load of 23 g/cm² could be added to homogeneity.

[0173] From the event of pouring 50ml of physiological salines into a liquid filling pipe, and pouring a physiological saline into a liquid filling pipe in this condition, time amount until a physiological saline is altogether absorbed by the simple absorber was measured, and this time amount was made into absorption time amount (second). Moreover, 5 minutes after repeating this actuation a total of 3 times every 5 minutes and performing 3rd actuation, an upper acrylic board and upper weight were removed, and after laying ten kitchen towels called NEPIA by NEW OJI PAPER CO., LTD. on a simple absorber, an upper acrylic board and upper weight were laid again. The above-mentioned kitchen towel measured weight beforehand.

[0174] 1 minute after performing this actuation, the weight of ejection and this kitchen towel was measured for the ten above-mentioned kitchen towels. And weight which subtracted the weight before actuation from the weight after actuation was made into the amount of return (g).

[0175] Consequently, 1st absorption time amount 535 seconds and the 2nd absorption time amount are 1185 seconds and the 3rd absorption time amount. It is 610 seconds and is the amount of return. It was 11.97g.

[Translation done.]